CPU Tests, Vol. 3
Troubleshooting Guide

Apple TechStep

For the Macintosh
IIci, IIsi, IIvi, IIvx, and
Performa 600

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Chapter 1
Setting Up

Connections

The *CPU Tests, Volume 3* ROM pack allows you to use the Apple TechStep diagnostic tool and six cables to test the Macintosh IIci, IIsi, IIvi, IIvx, and Performa 600 computers.

Install the ROM Pack

▲Caution **Always switch off Apple TechStep before you install ROM packs.**

Install the *CPU Tests, Volume 3* ROM pack. See "Installing a ROM Pack" in Chapter 3 of the *Apple TechStep User's Guide*. You may use either ROM pack slot, but slot A works best for the ROM pack you use most often. In the other slot you may use any other Apple TechStep ROM pack.

Prepare the Cables

You may find the cables easier to handle if you use cable ties to make a bundle of all six cables.

The serial cables used for the printer and modem ports are identical mini DIN-8 cables. Mark *modem* on both ends of one mini DIN-8 cable and use this cable to connect the computer modem port to the Apple TechStep modem port. Use the second, unmarked mini DIN-8 cable to connect the computer printer port to the Apple TechStep printer port.

Mark *ADB1* on both ends of one of the two ADB mini DIN-4 cables. Always connect this cable to ADB port marked *1* on the Apple TechStep port pack.

Note If you connect only one ADB cable to the computer, make sure that you connect the computer's ADB port to the ADB1 port on the Apple TechStep.

Connect the Cables

▲Caution **Always switch off Apple TechStep and the Macintosh computer before you connect cables. Connecting or disconnecting the ADB or SCSI cables while power is on may damage Apple TechStep or the Macintosh computer.**

Connect cables from the ports on the Apple TechStep port pack to the corresponding ports on the Macintosh computer. Connect the ports so that the icons match: printer port to printer port, etc.

Note For the Macintosh IIsi and any other computer with only one ADB port, connect the computer's ADB port to the ADB1 port on the Apple TechStep.

If you want to examine the entire computer, attach all cables so you can run All Logic tests. If you want to run a specific test or function, refer to Table 1-1, Test Availability and Cables, later in this chapter, and attach only the cables for that test or function.

Plugging the stereo (audio) cable into the Macintosh stereo port disables the Macintosh speaker. Therefore, if you connect the stereo cable to the computer, you won't hear a boot tone or error chimes when you boot the computer or enter the Test Manager.

Computers With an Internal Hard Drive

For computers that have an internal hard drive, use the Apple TechStep SCSI cable to connect Apple TechStep to the Macintosh computer SCSI port (see Figure 1-1).

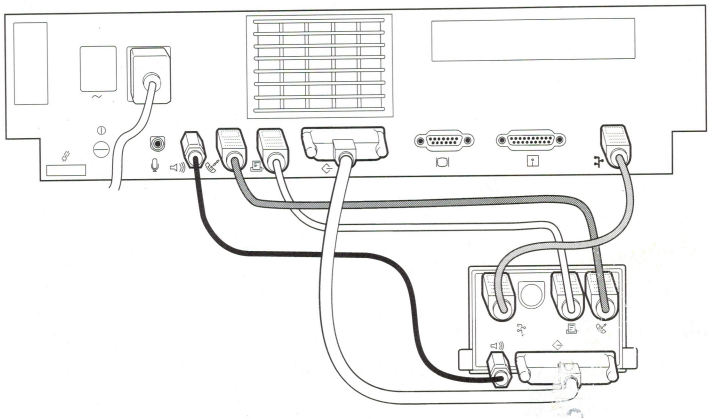


Figure 1-1 Connecting Apple TechStep to a Computer That Has an Internal Hard Drive

Computers Without an Internal Hard Drive

Use the Apple TechStep SCSI cable to connect Apple TechStep to the computer's SCSI port. For Macintosh IIci and IIsi computers that don't have an internal hard drive, you must switch on the Apple TechStep SCSI termination feature. For instructions, refer to "SCSI Bus Termination" in this chapter and to "SCSI Term – SCSI Termination Setting [On or Off]" in Chapter 2.

Note Macintosh IIvi, IIvx, and Performa 600 computers provide automatic SCSI bus termination, so it is not necessary to use the Apple TechStep termination feature.

Computers With an External SCSI Device

For computers with an external SCSI device, you can use a standard SCSI cable to connect Apple TechStep to the SCSI port of the last SCSI device on the SCSI bus (see Figure 1-2).

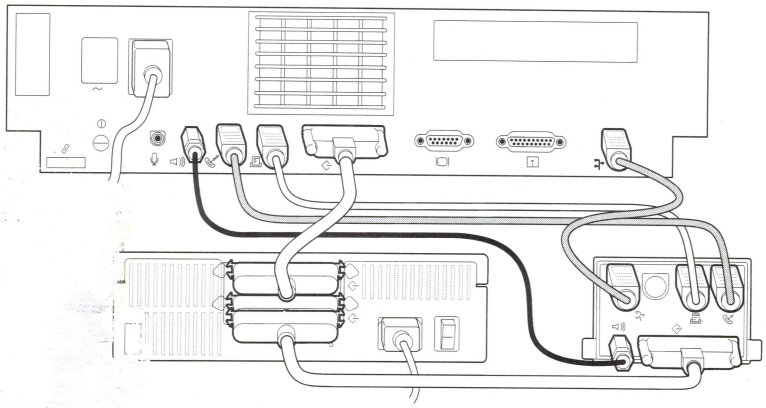


Figure 1-2 Connecting Apple TechStep to a Computer That Has an External SCSI Device

Use an Apple SCSI Cable Terminator on the last device on the SCSI bus. If you don't have a SCSI terminator, switch on the Apple TechStep SCSI termination feature. For instructions, refer to "SCSI Bus Termination" in this chapter and to "SCSI Term – SCSI Termination Setting [On or Off]" in Chapter 2.

Test Manager Mode

Most Apple TechStep tests require that the Macintosh computer be in Test Manager mode. The Test Manager is a set of built-in ROM commands in the Macintosh computer. The Test Manager allows an external device (i.e., Apple TechStep) to communicate with the Macintosh computer via the modem port.

Sad Macintosh

When a computer enters Test Manager mode, the screen often (but not always) displays the "sad Macintosh" icon. However, do not use the "sad Macintosh" icon as an indicator of successful Test Manager entry-—use the message on the Apple TechStep Test Manager (tstMd) screen (see Automatic Entry Via Apple TechStep later in this section).

Tones

Depending on the computer you are testing, you may also hear failure chimes when you enter the Test Manager. However, plugging the Apple TechStep stereo (audio) cable into the Macintosh computer stereo port disables the Macintosh computer speaker. Therefore, if you connect the stereo cable, you won't hear a boot tone or error chimes when you boot the computer or enter the Test Manager.

Methods of Test Manager Entry

A failure during the computer's power-on self-tests should put the computer in Test Manager mode. If the computer does not enter the Test Manager in this spontaneous manner, you must force it into Test Manager mode by using Apple TechStep or the manual methods explained in the following sections.

Automatic Entry via Apple TechStep

To enter Test Manager automatically:

1. Connect a SCSI cable, a mini DIN-8 cable (from the computer modem port to the Apple TechStep modem port), and the ADB1 cable (from the Apple TechStep ADB1 port to either ADB port on the computer).

Note Do not attempt to connect to the computer's ADB bus through the keyboard—use only the ADB ports on the computer itself.

2. Use the Apple TechStep Test Manager (tstMd) function to place the computer in Test Manager mode, see "tstMd – Test Manager Mode Entry" in Chapter 2.

Manual Entry (except Macintosh IIsi computers)

An ADB, SCSI, modem, or printer interface failure on the Macintosh IIci, IIvi, IIvx, or Performa 600 computers may require you to enter the Test Manager manually. To place the CPU in Test Manager mode manually:

1. Switch on the computer.
2. Press the nonmaskable interrupt (NMI ⦵) switch.

Note The Macintosh IIsi computer does not have a programmer's switch; therefore, you cannot use the manual method with this computer.

Troubleshooting Test Manager Entry

If you've tried manual entry (Macintosh IIci, IIvi, IIvx, and Performa 600 computers only) and Apple TechStep entry, but the Macintosh computer still won't enter Test Manager mode, try the following procedures. After each numbered step, retry Test Manager entry.

1. Check the SCSI, ADB, and modem cable connections between Apple TechStep and the computer under test. All three connections must be correct and secure.

2. Remove non-Apple products—such as accelerator cards, network cards, graphics cards, and hard drives. These products can cause difficulty in entering the Test Manager.

3. Remove Apple cards from the computer.

4. Test Manager code resides in the Macintosh computer ROM. Difficulty in entering Test Manager mode could indicate a ROM failure or a problem that prevents access to ROM. For instance, ROMs could be misaligned—especially after a ROM upgrade. Unplug the sound-out cable and switch on the computer. If you don't hear boot tones or error chimes, you probably have a ROM problem.

5. A bad SIMM may prevent the computer from entering the Test Manager. If you suspect a SIMM failure, power off the computer and swap one SIMM at a time until Test Manager entry succeeds.

6. Failure to enter Test Manager could be related to partial or complete failure of one or more of the following logic board components.

- System crystal/timing clocks
- Microprocessor
- Address or data lines
- Memory management unit (MMU)
- ROM
- Serial communications controller (SCC)
- Modem port

If steps 1–5 have not allowed you to enter the Test Manager, suspect the logic board.

Test Availability and Cables

Table 1-1 shows the functions, tests, and cable requirements for the Macintosh IIci, IIsi, IIvi, IIvx, and Performa 600 computers.

Apple TechStep must be in Test Manager Mode to run most of these tests. If you plan to use the automatic method of entering Test Manager Mode, connect the ADB1, modem, and SCSI cables in addition to any cables listed in the table below. Refer to "Test Manager Mode" in this chapter for more information.

If you plan to run the Sound test in the All Logic tests menu, connect the sound-out cable. However, note that the cable disconnects the computer speaker—you will not hear boot or error tones. On the other hand, if you disconnect the sound-out cable to hear the boot or error tones, the Sound test will fail and Apple TechStep will display the message, **Fail: no audio.**

Macintosh IIsi computers have only one ADB port. Connect the computer's ADB port to the ADB1 port on the Apple TechStep.

Table 1-1 Test Availability and Cables

Test or Function	IIci	IIsi	IIvi	IIvx	600	Cables
PowrS	√	√	√	√	√	ADB1 or ADB2*
PwUpV (or battery)	√	√	√	√	√	ADB1 or ADB2*
tstMd	√	√	√	√	√	ADB1*, modem, SCSI
cpuID	√	√	√	√	√	modem
Logic						(menu)
All	√	√	√	√	√	ADB1 and ADB2*, audio, modem, printer, SCSI
ROMck	√	√	√	√	√	modem
RAMsz	√	√	√	√	√	modem
Addr Bus	√	√	√	√	√	modem
Data Bus	√	√	√	√	√	modem
RAM (called "SIMMs" on IIci)	√	√	√	√	√	modem
Cache (Logic)				√		modem
VIA	√	√	√	√	√	modem
RBV	√	√				modem
VRMsz			√	√	√	modem
VRAM			√	√	√	modem
CLUT	√	√	√	√	√	modem

*ADB1 and ADB2 refer to the numbered AppleTechStep ADB ports, not to the computer ADB port(s). If connecting only one Macintosh ADB port to the Apple TechStep, ALWAYS use the Apple TechStep ADB1 port.

Table 1-1 Test Availability and Cables (con't.)

Test or Function	IIci	IIsi	IIvi	IIvx	600	Cables
Clock	√	√	√	√	√	modem
P/RAM	√	√	√	√	√	modem
ADB (Logic)	√	√	√	√	√	ADB1 and ADB2*, modem
SCC	√	√	√	√	√	modem, printer
SCSI	√	√	√	√	√	modem, SCSI
SWIM	√	√	√	√	√	modem
FPU	√			√		modem
Sound	√	√	√	√	√	audio, modem
Cache (card)	√					modem
FPU			√		√	modem
Floppy Drive	√	√	√	√	√	modem
Built-in Video						(menu)
Monitor ID	√	√	√	√	√	modem, video (monitor to computer)
Video Patterns	√	√	√	√	√	modem, video (monitor to computer)
NuBus Cards	√		√	√	√	modem
Expansion Slot (IIsi)						(menu)
AdapterCd FPU		√				modem
Expansion Card		√				modem

*ADB1 and ADB2 refer to the numbered AppleTechStep ADB ports, not to the computer ADB port(s). If connecting only one Macintosh ADB port to the Apple TechStep, ALWAYS use the Apple TechStep ADB1 port.

Table 1-1 Test Availability and Cables (con't.)

Test or Function	IIci	IIsi	IIvi	IIvx	600	Cables
More RAM						(menu)
Standard	√	√	√	√	√	modem
Extended	√	√	√	√	√	modem
Long (Mvg Inv)		√	√	√	√	modem
All	√	√	√	√	√	modem
ADB Status	√	√	√	√	√	ADB1 or ADB2*
SCSI Term ON/OFF	√	√	√	√	√	none
SCSI Functions Menu						(menu)
SCSI Term Powr	√	√	√	√	√	SCSI
SCSI Term Chk	√	√	√	√	√	SCSI
SCSI Bus Scan	√	√	√	√	√	SCSI
ApITS SCSI #	√	√	√	√	√	none
SCSI Bus Reset	√	√	√	√	√	SCSI
Power On CPU	√	√	√	√	√	ADB1 or ADB2
Power Off CPU	√	√	√	√	√	ADB1 or ADB2, modem

*ADB1 and ADB2 refer to the numbered AppleTechStep ADB ports, not to the computer ADB port(s). If connecting only one Macintosh ADB port to the Apple TechStep, ALWAYS use the Apple TechStep ADB1 port.

SCSI Bus Termination

Apple TechStep offers a SCSI bus termination function (SCSI Term [ON or OFF]), which you can access from the HOME menu (see Chapter 2, Test & Function Descriptions). This feature is also available within tests that require the SCSI bus. If you begin testing a unit that is not terminated, Apple TechStep will prompt you with a message that gives you the option to terminate the SCSI bus before continuing.

The first and last devices in a SCSI bus chain must be terminated. The Macintosh IIci and IIsi computers do not provide termination on the logic board. The Macintosh IIvi, IIvx, and Performa 600 computers do.

Macintosh IIci and IIsi Computers

Table 1-2 illustrates the proper termination of the SCSI bus for Macintosh IIci and IIsi computers. The table assumes that SCSI termination on internal hard drive functions correctly. Remember that:

- The last SCSI device in an external chain always needs termination.
- If Apple TechStep reports a lack of termination, switch on the Apple TechStep SCSI termination feature.

Table 1-2 SCSI Bus Termination For Macintosh IIci and IIsi

Internal Hard Drive ?	Terminated External SCSI Device?	Termination Status Without Apple TechStep	Set Apple TechStep SCSI Term Feature To:
Yes	Yes	Terminated	OFF
Yes	No	Terminated	OFF
No	Yes	Terminated	OFF
[illegible]	No	Unterminated	ON

Note: [illegible] Macintosh [illegible] and Performa 600 are self-terminating. If any of these computers require [illegible] termination, suspect a termination problem on the logic board.

Macintosh IIvi, IIvx, and Performa 600 Computers

The Macintosh IIvi, IIvx, and Performa 600 computers provide automatic SCSI bus termination at startup in the following two cases:

- When there are no internal SCSI devices installed.
- When an internal SCSI device is installed in the 5.25" bay.

Important The presence of terminating resistors depends on the location of the SCSI device:

- If terminating resistors are present on a SCSI device in the 5.25" bay, you must remove them.
- If terminating resistors are NOT present on a SCSI device installed in the 3.5" bay, you must install them.
- If you have external SCSI devices attached, the last device in the chain must be terminated.

If Apple TechStep reports a lack of termination on a IIvi, IIvx, or Performa 600 computer, you should test the computer's automatic SCSI termination feature as follows:

1. Turn on the Apple TechStep termination function.
2. Reboot the computer.
3. Turn off Apple TechStep termination.
4. Run the SCSI Term Chk test. The test should fail.
5. With Apple TechStep termination still off, reboot the computer.
6. Run the SCSI Term Chk test again. This time the test should pass. If the test does not pass, you have a problem with the logic board.

Chapter 2
Test & Function Descriptions

Introduction

This chapter contains descriptions of the tests, functions, and introductory screens in the *CPU Tests, Volume 3* ROM Pack. These descriptions include the following:

- The computers that each test covers
- What each test or function does
- Test pass/fail criteria
- Components under test
- Log notes

Table 1-1 lists the tests and functions for the Macintosh IIci, IIsi, IIvi, IIvx, and Performa 600 computers and shows the cables you need for each test.

If you need assistance in navigating menus, see "Using the Keypad and Menus" in Chapter 2, Getting Acquainted, of the *Apple TechStep User's Guide*.

Important **Only Apple Authorized service providers may replace parts. If you are not an Apple Authorized service provider, do not attempt the replacement steps in this section. Take your system to an Apple Authorized service provider for service. If you do attempt to service your own system without being authorized, you assume all liability and risk of personal and/or equipment damage.**

Menu Order

The test and function descriptions follow the order of tests on the menus. Tests that are first in the menu have the fewest prerequisites—that is, have the least dependence on the correct functioning of untested components. Chapter 3, Troubleshooting Strategies, discusses how to use the test and function hierarchy to aid your troubleshooting.

Screen Logs

To view the on-screen logs, press * *show*. For pass/fail tests you see:

- Test names (five-character abbreviations)
- The number of times you ran the test (**Run** column)
- The number of times the test failed (**Err** column)

Figure 2-1 shows an on-screen log for a ROMck test when the ROM pack was in slot A. The test ran once and found no (–) errors.

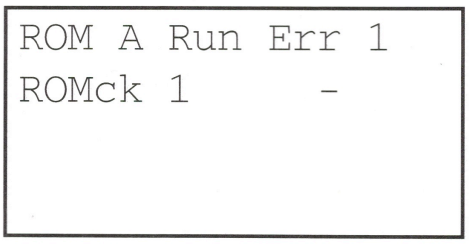


Figure 2-1 Screen Log

For tests that aren't pass/fail (measurements, for example), the log shows:

- Test names (five-character abbreviations)
- Explanatory message of up to ten characters

If a test log entry ends with a question mark (**?**) at the extreme right of the screen (character 16) or if the message **PFF?** appears, the test stopped because of a prior-function failure. See Chapter 3, Troubleshooting Strategies, for information on how to interpret prior-function failures. For information on question marks, see the heading below.

Some tests that give results for more than one module (RAM tests, video card tests) start the log entry with a full-line test name (**HiRes Video Card**, for example). The results for each module appear after the test name. For an example, see the RAM Standard test.

The Question Mark

Besides indicating prior-function failures in the test log (see above), the question mark (**?**) is used on test result screens to indicate that the result is uncertain or requires your special attention.

For example, when a RAM test fails, the Apple TechStep screen shows the RAM size followed by a **?** because the RAM failure could cause Apple TechStep to misread the size—for example, if the failure is so complete that some RAM is not even sensed.

In other tests, the **?** follows a message concerning the most likely cause of the failure. The **?** reminds you that most failures have many possible causes—including missing, incorrect, or loose test cables.

Extended Failure Information

Some tests report more failure information than a simple *test failed*. This *extended* failure information does not fit on the Apple TechStep on-screen test log. However, the extended information does appear in the print (Report Generator) test log.

Extended failure information sometimes reports specific IC failures. **Apple does not authorize IC-level repair of circuit boards**. If the failed component is soldered to the logic board, the logic board should be replaced.

Print (Report Generator) Logs

You can print Apple TechStep logs by using a Macintosh computer and the *Report Generator* application. Instructions are in Chapter 4, Test Logs and Reports, of the *Apple TechStep User's Guide*. Figure 2-2 shows a sample Report Generator log.

Apple TechStep™ Test Report

December 24, 1992

9:23pm

ROMPACK A CPU Tests, Vol.3 1.0

ROM Pack Log ID# 12

Test Name	Description	Runs	Errs	Other
Data	Data Bus Test	1	1	UUT Timed out.
Clock	Clock Test	1	1	FAIL:ClkTimeTest
RAMsz	RAM size	-	-	1 MB
SCSI Term Powr	SCSI Term Power	-	-	1.00 Vdc
SCC	SCC Test	1	1	FAIL:Prntr(TXD)

** END OF LOG **

Figure 2-2 Print (Report Generator) Log of Test Results

The following two screens appear before you see the test and function menus.

ROM Pack Title

Figure 2-3 shows the title screen for the *CPU Tests, Volume 3* ROM pack. The screen appears each time you switch on Apple TechStep or press the ***rom a** or ***rom b** command to switch ROM packs. The screen appears for five seconds or until you press any key. The **N** in line one will be **A** or **B**, depending on which slot contains the ROM pack.

```
ROM in slot N
CPU Tests, Vol. 3
©Apple Computer,
Inc., 1993
```

Figure 2-3 ROM Pack Title Screen

Identify CPU

As Figure 2-4 shows, the second screen asks you to identify the Macintosh computer you wish to test. Enter the correct number.

```
Identify CPU:
1-IIci    4-IIvx
2-IIsi    5-Pf600
3-IIvi
```

Figure 2-4 Identify CPU Screen

The HOME menu is the starting point of the test hierarchy. This section of the manual describes each of the HOME menu functions and the submenus you can access from the HOME menu. For an explanation of the test hierarchy, see the introduction to this chapter and Chapter 3, Troubleshooting Strategies.

PowrS – Power Supply Voltage Measurement

Necessary cable: ADB (Apple Desktop Bus™)(Connect the computer ADB port to the Apple TechStep ADB1 port .)

Component under test: Power supply, by means of ADB power supply voltage (+5 V) line

Screen log format:

```
ROM A Run Err
PowrS  4.98 Vdc
```

PowrS measures the voltage on the +5 V line that flows through pin 3 (power) of the ADB port(s). Apple TechStep displays the voltage in real time and indicates whether the voltage is **OFF**, **LO**, **OK**, or **HI**, as follows:

OFF – 0 to 1.99 V
LO – 2.0 to 4.79 V
OK – 4.8 to 5.24 V
HI – 5.25 V and above

Figure 2-5 shows a sample power supply voltage measurement screen.

```
MacIIsi
Power Supply
Actual=5.00V: OK
Normal=>4.80V
```

Figure 2-5 Power Supply Voltage Measurement

To perform a power supply voltage measurement:

1. Switch on the computer.
2. Choose the CPU.
3. Select **PowrS** from the menu.

The test reads voltage continuously until you press any key except the star key (*). When you press a key, the test stops and records the voltage in the test log. The test voltage on line three of Figure 2-5 should be approximately 5 V and the end of line three should show **OK**.

If the power supply voltage measurement is **LO** or **HI**, see Chapter 4, Symptom/Action Tables. A **LO** or **OFF** voltage may indicate that a heat-sensitive fuse on the logic board has opened on the pin-3 line. The fuse closes automatically as it cools. Switch off power to the computer, wait one minute, and test again. To confirm this condition, run the ADB Status test, which tests line two (PowerUpKey voltage) and line three (+5 V) of the ADB port. For more information, see the ADB Status test description.

PwUpV – Power-Up (or Battery) Voltage Measurement

Necessary cable(s): ADB (Connect the Macintosh IIsi computer ADB port to the Apple TechStep ADB1 port .)

Components under test: Power supply and ADB power-up (trickle) voltage line; can also be used to measure battery voltage on Macintosh IIsi, IIvi, IIvx, and Performa 600 computers

PwUpV measures the power-up voltage on the ADB PowerUpKey line (pin 2). The power-up voltage powers up the Macintosh computer when you press the keyboard power-up switch. The power-up voltage should be present if the computer is connected to AC current (the computer need not be switched on), and if the power supply functions.

Power-Up Voltage Measurement

When Apple TechStep displays the power-up voltage (see Battery Voltage Measurement), the result is in real time and the voltage is **LO**, **OK**, or **HI**, as follows:

LO – 0 to 3.99 V
OK – 4.00 to 5.49 V
HI – 5.50 V and above

Figure 2-6 shows a sample power-up voltage measurement screen. The **Normal** voltage is accurate only when measuring AC power-up voltage, not when measuring battery voltage.

```
MacIIsi
Power Up Voltage
Actual=4.29V: OK
Normal=>4.00V
```

Figure 2-6 Power-Up Voltage Measurement

Measurement and Diagnosis of Power-Up Voltage

Note Don't confuse this test with the Battery Voltage test below.

To perform a power-up voltage measurement:

1. Connect the AC power cable to the Macintosh computer and to a working wall outlet. (The computer can be on or off when you measure power-up voltage.)
2. Select **PwUpV** from the menu.

The test reads voltage continuously until you press any key except the star key (*). When you press a key, the test stops and records the voltage in the test log. The voltage should be approximately 5 V and line three should show **OK**.

If the power-up voltage measurement is **LO** or **HI**, see Chapter 4, Symptom/Action Tables.

Battery Voltage Measurement (except IIci)

On the Macintosh IIci computer, PwUpV always measures the ADB power-up voltage. On the Macintosh IIsi, IIvi, IIvx, and Performa 600 computers, PwUpV measures ADB power-up voltage only if the computer is connected to AC power. If these computers are not connected to AC power, PwUpV measures the computer battery voltage. (The battery maintains the real-time clock and user preferences when the computer is powered off.)

Battery Voltage Measurement and Diagnosis (except IIci)

To perform a battery voltage measurement:

1. Disconnect the power cable to the Macintosh IIsi, IIvi, IIvx, or Performa 600 computer.
2. Wait approximately 30 seconds.
3. Select **PwUpV** from the menu.

The test reads voltage continuously until you press any key except the star key (*). When you press a key, the test stops and records the voltage in the test log. The voltage should be approximately 3.75 V. (Disregard the **LO** at the end of line three and the **Normal=>4.00V** on line four—they apply to the power-up voltage measurement only.)

If the measurement is below 3 V, the battery on the logic board may be faulty.

TstMd – Test Manager Mode Entry Function

Necessary cables: ADB1, modem, SCSI
Prerequisites: Functional AC power cable, power supply, and ROM

Most Apple TechStep tests require that the computer under test be in Test Manager mode. The TstMd function allows you to force a Macintosh computer into Test Manager mode.

Problems Entering Test Manager Mode

On computers with large amounts of RAM (>32 MB), Test Manager entry via the SCSI method may take significant time—about two seconds per MB. On Macintosh IIci computers the SCSI method is the only method of entering Test Manager using the TstMd feature; thus on Macintosh IIci computers with large amounts of memory, you may find it quicker to use the manual entry method described in Chapter 1, Setting Up.

Third-party products can cause difficulty in entering the Test Manager. If you can't establish communication with the Test Manager, first remove non-Apple products. If you still have problems, remove Apple cards and see Troubleshooting Test Manager Entry in Chapter 1.

Tones

The Test Manager usually generates tones—unless the sound-out cable is connected. However, listening for the tones is not a foolproof method of determining whether the computer has entered the Test Manager. The most certain method is to watch the Apple TechStep screen.

Entry Procedure

To place the Macintosh computer in Test Manager mode, select **TstMd** from the HOME menu. You will briefly see the screen in Figure 2-7.

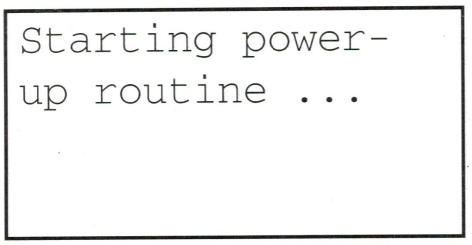


Figure 2-7 Test Manager In-Progress Screen

Follow the instructions on the screen. When the process is successful and complete, the screen in Figure 2-8 appears.

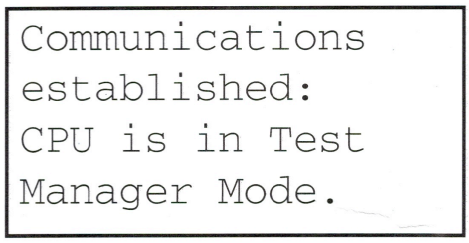


Figure 2-8 Communications Established Screen

forget to choose **TstMd** before you run a test, you have a second
e test you chose requires that the computer be in Test Manager
est will check for Test Manager communication before the test
e test cannot communicate with the Test Manager, the test will
in Figure 2-9.

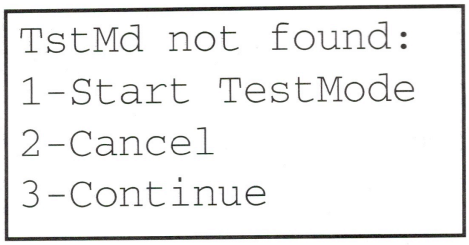


Figure 2-9 Test Manager Not Found

Press **1** to invoke the Test Manager Mode Entry function, **2** to return to the previous menu, or **3** to attempt the test or function without entering the Test Manager. (Attempting to continue the test without Test Manager will usually not succeed.) The continue option allows you to make changes to the system or correct obvious mistakes without backing out to the previous menu.

ADB Method of Entry

On the Macintosh IIsi, IIvi, IIvx, and Performa 600 computers, the TstMd function first attempts to use ADB circuits to enter Test Manager mode. The ADB method of entry is almost instantaneous. While attempting to enter Test Manager mode, you will see one of the messages in Table 2-1.

Because the Macintosh IIci computer does not contain the necessary circuits, the ADB method does not work on this computer. Thus on the Macintosh IIci, you can enter Test Manager mode via Apple TechStep exclusively through the SCSI method.

SCSI Method of Entry

If the ADB method fails—or is not available, as is the case [illegible] computer—you have an option to try the SCSI method of [illegible]. On computers with large amounts of RAM (>32 MB), T[illegible] the SCSI method may take significant time—abo[illegible] Macintosh IIci computers the SCSI method is t[illegible] the Apple TechStep Test Manager feature; thus on M[illegible] large amounts of memory, you may find it quick[illegible] method described in Chapter 1, Setting Up.

During the SCSI entry method, one or m[illegible] in Table 2-2 may appear.

Table 2-1 ADB Method of Test Manager Entry—Messages*

Message	Explanation	Action
Attempting to enter Test Manager Mode via ADB...	This message appears while the ADB entry sequence is in progess.	Wait for Apple TechStep to attempt the ADB method.
If CPU is OFF, turn ON. Else: 1-Continue 2-Cancel	Power to the computer is off.	If the message does not disappear, press **1** to continue. You'll probably see an error message concerning an ADB cable or circuitry problem.
Serial Error: Check Modem-to-Modem connection (Press BACK)	The computer modem port is connected to the Apple TechStep printer port.	Press the **back** key to return to the menu. Power off CPU and correct the cable misconnection.
Fail: No power on ADB PwrUpKeyLine. 1-Try SCSI method 2-Cancel	ADB cable or power supply problem.	Press **1** to try SCSI method. If SCSI method does not work, probable causes are 1) cable 2) power supply
Fail: No power on ADB Power Line. 1-Try SCSI method 2-Cancel	The ADB power pin is registering less then 4 V. A heat-sensitive fuse on the logic board may have opened. The fuse closes automatically as it cools.	Switch off power to the computer, wait one minute, and test again. If the message reappears, run the PwUpV test.
Fail: No ADB communications. 1-Try SCSI method 2-Cancel	Apple TechStep cannot communicate with the computer via ADB. A problem could exist with the ADB cable or the logic board.	Press **1** to attempt the SCSI method. If the SCSI method does not work: Swap ADB cable(s) and retry ADB method.
Could not enter TstMd via ADB 1-Try SCSI method 2-Cancel	Apple TechStep established initial communication, but could not continue to communicate. A problem could exist with the ADB cable or the logic board.	Press **1** to attempt the SCSI method. If the SCSI method does not work: Swap ADB cable(s) and retry ADB method. If you still cannot enter test manager mode, the probable cause is the logic board.

*Do not use the ADB Test Manager entry with the Macintosh IIci computer.

Table 2-2 SCSI Method of Test Manager Entry—Messages

Message	Explanation	Action
Serial Error: Check Modem-to-Modem connection (Press BACK)	The computer modem port is connected to the Apple TechStep printer port.	Press the **back** key to return to the menu. Power off CPU and correct the cable misconnection.
Please turn CPU power OFF. (BACK=cancel)	The computer is powered on and not in the Test Manager mode.	Switch the Macintosh computer off.
If CPU is OFF, turn ON. Else: 1-Continue 2-Cancel	TechStep did not find power supplied to the computer.	If the message does not disappear, press **1** to continue. You'll probably see an error message concerning an ADB cable or circuitry problem.
SCSI Termination MISSING. 1-Terminate bus 2-Cancel	The computer does not have valid termination.	Press **1** to terminate bus and continue Test Manager entry. Press 2 to cancel and return to Home menu.
Could not terminate SCSI (Cable problem?) (Press BACK)	Apple TechStep could not provide valid termination. SCSI cable may be at fault or SCSI termination power may be missing.	Check SCSI cables. Attempt manual entry to Test Manager.* Refer to Troubleshooting Test Manager Entry in Chapter 1, Setting Up.
Could not enter TstMd via SCSI. Try manual entry. (Press BACK)	The Macintosh IIci computer has not entered the Test Manager mode.	Try manual method of Test Manager entry.
Could not enter TstMd via ADB or SCSI (Press BACK)	The ADB and SCSI methods of Test Manager entry failed for the Macintosh IIsi.	Check the cables connecting Apple TechStep and the computer. If you still can't enter test mode via either method, check the logic board.
Could not enter via ADB or SCSI. Try manual entry (Press BACK)	The ADB and SCSI methods of Test Manager entry failed for the Macintosh IIvi, IIvx, or Performa 600.	Try manual method of Test Manager entry.

* Do not try manual test manager entry on a Macintosh IIsi computer.

Test Manager Entry Failure

If neither the ADB method nor the SCSI method succeeds in providing Test Manager entry, the screen in Figure 2-10 appears for the Macintosh IIvi, IIvx, and Performa 600 computers. A similar screen appears for the Macintosh IIci if the SCSI method of entry fails.

Because the Macintosh IIsi computer does not have a programmer's switch, the manual method is not available and line three of Figure 2-10 does not appear.

```
Could not enter
via ADB or SCSI.
Try manual entry.
(Press BACK)
```

Figure 2-10 Test Manager Not Found Screen

If the ADB, SCSI, and manual methods of Test Manager entry are all unavailable or unsuccessful, see Troubleshooting Test Manager Entry in Chapter 1, Setting Up.

cpuID (Verification) – Verification of Computer Identification

Necessary cable: modem

Log notes: The computer type appears in the screen log and the printed log, but ROM version and sub-version information does not.

The cpuID function attempts to identify the computer under test and displays the result. This function can help identify upgraded Macintosh computers—for example, a Macintosh IIcx case that contains a Macintosh IIci logic board. Figure 2-11 shows a sample result screen.

```
MacIIci
Verify CPU ID
CPU is: MacIIci
Press 0 for info
```

Figure 2-11 cpuID (Verification) Result Screen

Presing **0** gives the ROM version and sub-version (see Figure 2-12). Line one shows **$** and the first three hexadecimal characters of the ROM version; line three shows **$** and the last four characters of the sub-version information. The **$** identifies the number as hexadecimal.

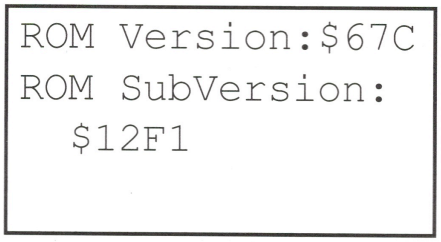


Figure 2-12 cpuID (Verification) Info Screen

For the Macintosh IIci computer, the ROM does not contain a version number or subversion number. Therefore, the screen in Figure 2-13 appears. Line four indicates the presence or absence of parity RAM.

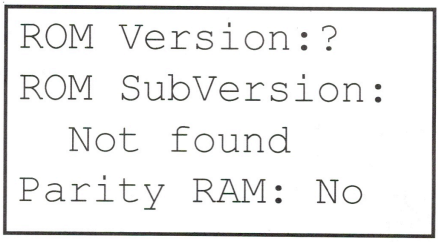


Figure 2-13 cpuID (Verification) Info Screen for IIci Computers

If the computer is not the type you indicated by responding to the Identify CPU screen, **MISMATCH** appears on line four of the cpuID (Verification) screen, as Figure 2-14 shows.

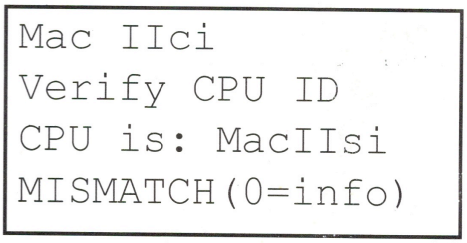


Figure 2-14 Mismatch cpuID (Verification) Screen

If Apple TechStep can't identify the computer, **Unknown** appears on line three, as Figure 2-15 shows. **Unknown** appears if the computer is anything but a Macintosh IIci, IIsi, IIvi, IIvx, or Performa 600.

```
Mac IIsi
Verify CPU ID
CPU is: Unknown
MISMATCH(0=info)
```

Figure 2-15 Unknown cpuID (Verification) Screen

Logic – Logic Tests Menu

Table 1-1, Test Availability and Cables, summarizes the cables you need for tests in the Logic menu.

The Logic tests verify operation of the circuitry on the logic board. From the Logic submenu you can choose **ALL** to run all the Logic tests in sequence, or you can choose individual Logic tests.

To perform Logic tests:

1. Select **Logic** from the HOME menu.
2. If you want the test(s) to run in looped mode, press ***loop**.
3. Select **ALL** or an individual test.

ALL – All Logic Tests

Necessary cables: all cables—modem, printer, SCSI, audio, and both ADB cables (Except Macintosh IIsi: Connect the Macintosh IIsi computer ADB port to the Apple TechStep ADB1 port.)

Selecting **ALL** performs all the tests on the Logic menu.

In looping mode, All Logic tests continue to run even if errors occur. In nonlooping mode, testing stops at the first error. Selecting **ALL Logic tests** chooses the nondestructive version of the P/RAM test and the Standard version of the RAM test.

ROMck – ROM Checksum Test

Necessary cable: modem

ROMck performs a checksum of the system ROM. Figure 2-16 shows a sample test result screen.

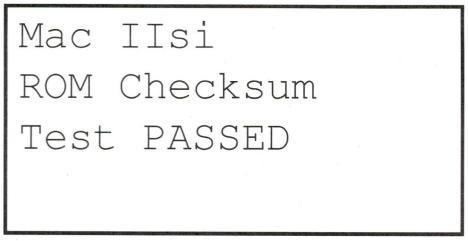


Figure 2-16 ROM Checksum Test Result Screen

The test fails if the calculated checksum does not match the checksum in the Macintosh ROMs. (This test does not identify individual ROM failures—refer to Chapter 4, Symptom/Action Tables.)

RAMsz – RAM Size Measurement

Necessary cable: modem

Log Notes: The screen log shows the total RAM size only. The test results screens give you additional information: the amount of soldered (non-SIMM) RAM and the location of mismatched, missing, or faulty RAM. Soldered RAM results and SIMM locations do not appear in the RAMsz screen or printed (Report Generator) logs. If you want RAM failure information to appear in the logs, run the Standard RAM test.

Screen log format:

```
RAMsz    5MB
```

Description

The RAM Size test calculates and displays the amount of RAM installed in the computer (including RAM SIMMs and soldered RAM on the logic board, if any). If RAM or SIMMs are badly damaged, the RAM Size test may be able to detect the failures and point them out. However, RAM Size is not a thorough test of the system RAM. To test RAM thoroughly, you must run one or more of the RAM tests: RAM or SIMMs (Logic menu), or Standard, Extended, or Long RAM tests (More RAM Tests menu).

On the failure information screen, a SIMM marked **x** is either bad or mismatched (smaller than the other SIMMs in the bank). The RAM Size test cannot distinguish between bad and mismatched SIMMs — if the test fails, you must visually inspect the SIMMs. If they are of different sizes, all may be good, but you cannot use them in the same bank. If all SIMMs are the same size, the ones marked **x** on the failure screen are faulty.

When soldered RAM is faulty, or when SIMMs are faulty or mismatched, RAM Size cannot accurately calculate memory size, so a **?** appears after the size (for instance, **5MB**?).

Apple TechStep tests any size of RAM SIMM, from 256K up to 16 MB. (Note that 512K SIMMs should never be installed in the Macintosh IIvi, IIvx, and Performa 600 computers. The 512K SIMMs cause the computer self-test to fail, resulting in error tones and the "sad Macintosh" icon.)

Screens of Successful Measurements

Figure 2-17 shows a successful RAM Size measurement for the Macintosh IIci computer. Line four shows the amount of RAM in bank A. The Macintosh IIci contains two banks of RAM SIMMs (bank A and bank B) but no soldered RAM; you can use the information on lines three and four to calculate the RAM in bank B.

```
MacIIci
RAM Size
Total: 5MB
BANK A: 1MB
```

Figure 2-17 Successful RAM Size Measurement Screen for IIci Computer

Figure 2-18 shows a successful RAM Size measurement for the Macintosh IIsi, IIvi, IIvx, and Performa 600 computers. The amount of RAM in the four SIMM slots is the difference between the numbers in lines three and four.

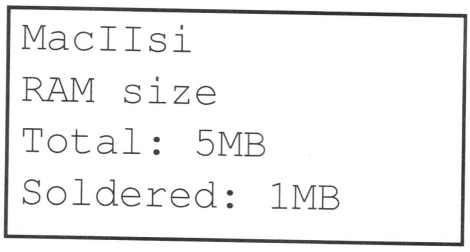


Figure 2-18 Successful RAM Size Measurement Screen for IIsi, IIvi, IIvx, and Performa 600 Computers

RAM and VRAM SIMM Slot Locations

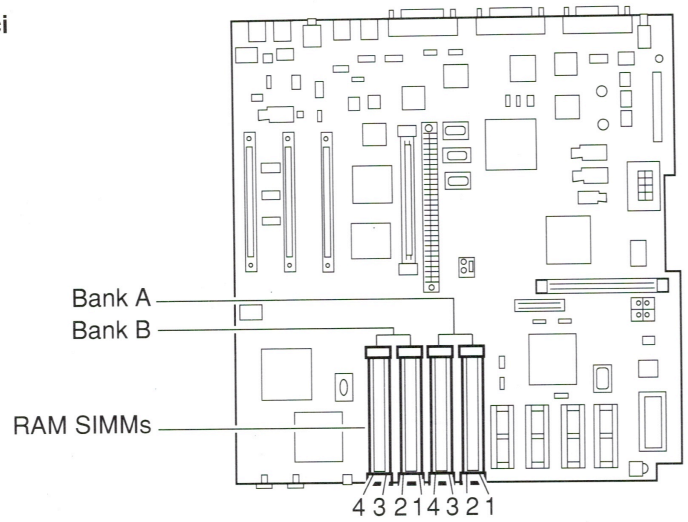
Figure 2-19 shows RAM and VRAM SIMM slot locations on the Macintosh IIci, IIsi, IIvi, IIvx, and Performa 600 logic boards.

Key to SIMM Slot Locations

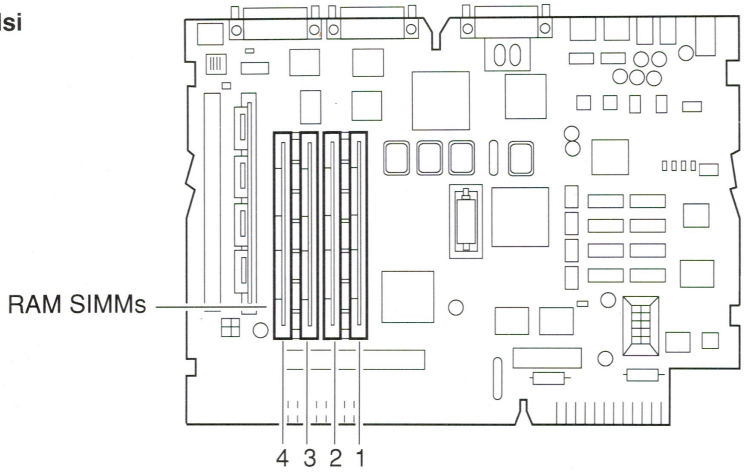
On the Macintosh IIci and IIsi, SIMM slots and banks are numbered (or lettered) from right to left. These numbers and letters appear in test result screens and logs. The bank letters are silkscreened onto the logic boards; the slot numbers do not appear on the logic boards.

LM, LL, HH, and **HM** are programming address locations for the SIMMs. The letters appear in silkscreen on the Macintosh IIvi, IIvx, and Performa 600 logic boards.

Macintosh IIci



Macintosh IIsi



Macintosh IIvi, IIvx, Performa 600

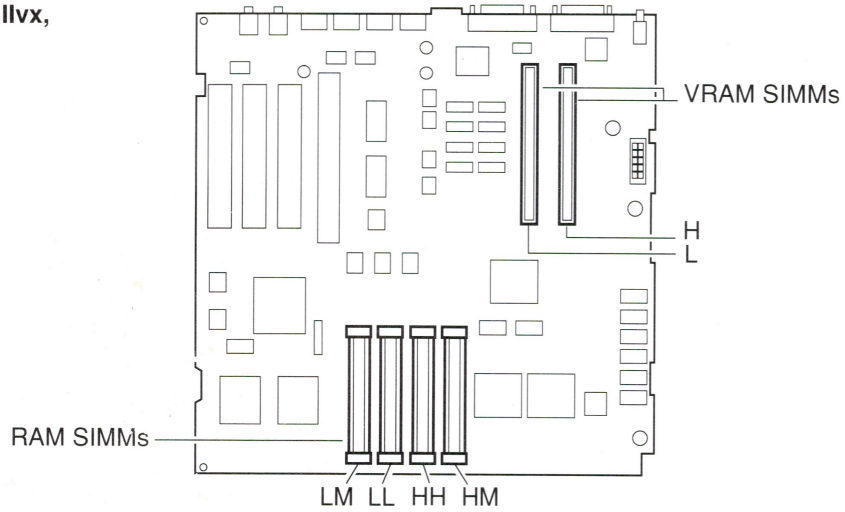


Figure 2-19 RAM and VRAM SIMM Slot Locations

Failure Message

Figure 2-20 shows a sample RAM size message screen that appears when the measurement fails.

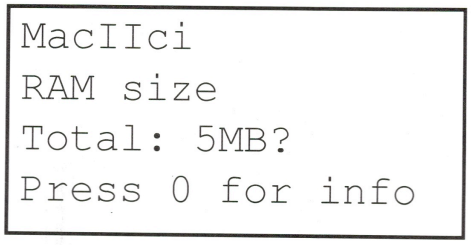


Figure 2-20 RAM Size Failure Screen

Failure Information for Macintosh IIci Computers

Pressing **0** in Figure 2-20 for a Macintosh IIci computer gives a screen similar to the one in Figure 2-21.

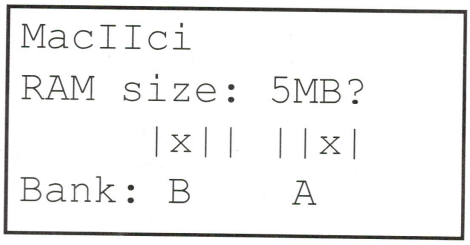


Figure 2-21 RAM Size Failure Info Screen for IIci Computers

You can interpret this screen as follows:

| = Functioning SIMM at this location. If the screen shows "||||," you have four functional SIMMs or no SIMMs in any slot of this bank.
x = Faulty, missing, or mismatched SIMM at this location (**x** represents the smallest SIMM in a bank that has several sizes).
? = Because of mismatched or faulty SIMMs, Apple TechStep cannot determine total RAM size definitely.

Failure Information for Macintosh IIsi Computers

Pressing **0** in Figure 2-20 for Macintosh IIsi computers gives a screen similar to the ones in Figure 2-22.

```
MacIIsi     5MB?
SIMM failure:
SIMM   |   x   |   |
Slot: 4   3   2   1
```

```
MacIIsi     5MB?
SolderedRAM:FAIL
SIMM   |   |   |   |
Slot: 4   3   2   1
```

Figure 2-22 RAM Size Failure Info Screens for IIsi Computers

You can interpret these screens as follows:

| = Functioning SIMM at this location. If the screen shows "||||," you have four functional SIMMs or no SIMMs in any slot of this bank.

x = Faulty, missing, or mismatched SIMM at this location (**x** represents the smallest SIMM in a bank that has several sizes).

? = Because of faulty RAM, or mismatched or faulty SIMMs, Apple TechStep cannot determine total RAM size definitely.

SolderedRAM = RAM soldered to the logic board. If the **SolderedRAM: FAIL** message appears, the logic board is probably faulty.

Failure Information for IIvi, IIvx, and Performa 600 Computers

Pressing **0** in Figure 2-20 for Macintosh IIvi, IIvx, and Performa 600 computers gives a screen similar to the ones in Figure 2-23.

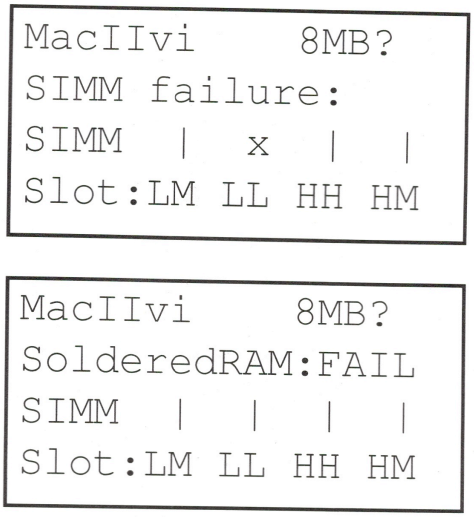


Figure 2-23 RAM Size Failure Info Screens for IIvi, IIvx, and Performa 600 Computers

You can interpret these screens as follows:

| = Functioning SIMM at this location. If the screen shows "||||," you have four functional SIMMs or no SIMMs in any slot of this bank.

x = Faulty, missing, or mismatched SIMM at this location (**x** represents the smallest SIMM in a bank that has several sizes).

? = Because of faulty RAM, or mismatched or faulty SIMMs, Apple TechStep cannot determine total RAM size definitely.

SolderedRAM = RAM soldered to the logic board. If the **SolderedRAM: FAIL** message appears, the logic board must be replaced.

Testing and Replacing Soldered RAM

Apple TechStep does not directly report that soldered RAM is good. If SIMMs fail but soldered RAM is good, the message **SIMM failure** appears on line two of the screens shown in Figures 2-22 and 2-23.

Note When the soldered RAM is bad, Apple TechStep does not identify individual ICs because they cannot be replaced. If soldered RAM is bad, the logic board should be replaced.

More RAM Information

For more extensive RAM testing, run the RAM (Standard) test in the Logic menu, or the tests in the More RAM Tests menu.

Addr – Address Bus Test

Necessary cable: modem

Log Notes: The log entry shows a pass or fail result only. For some failures, the result screen may give additional information: the location of mismatched or faulty RAM. This additional information does not appear in the Address Bus log. If you want RAM failures to appear in a log, run the Standard RAM test.

This test confirms that the address bus lines are intact and unique. Figure 2-24 shows a sample test result screen.

```
MacIIsi
Address Bus Test
Test PASSED
RAM SIZE:  10MB
```

Figure 2-24 Address Bus Test Result Screen

When complete, the test indicates that the address bus test passed or failed.

The Address Bus test can fail in two ways: as a RAM size measurement failure or as a true Address Bus test failure. When you run the Address Bus test, Apple TechStep runs the RAM Size test first. If the RAM Size test detects a failure, the Address Bus test displays **FAIL:RAM size** and asks you to press **0** for information. The information screen is the same as for the RAM Size test.

If the RAM Size section of the Address Bus test passes but the Address Bus test itself fails, the screen in Figure 2-25 appears.

```
MacIIsi
Address Bus Test
FAIL:Address Bus
```

Figure 2-25 Address Bus Test Failure Screen

Failure of the Address Bus test (assuming the RAM Size test passes) indicates a faulty or misseated SIMM, or a bad logic board. The Address Bus test itself

cannot identify the faulty RAM location. To find out the location, run a RAM test—Standard, Extended, or Long.

Data – Data Bus Test

Necessary cable: modem

Log Notes: The screen and print (Report Generator) logs report a pass or fail result only. The result screens give additional information: the size and location of mismatched or faulty RAM. This additional information does not appear in the Data Bus log. If you want RAM failures to appear in a log, run the Standard RAM test.

This test checks the data bus. Figure 2-26 shows a sample test result screen.

```
MacIIsi
Data Bus Test
Test PASSED
RAM size: 5MB
```

Figure 2-26 Data Bus Test Result Screen

When complete, the test indicates that the Data Bus test passed or failed. The Data Bus test can fail in two ways: as a RAM size measurement failure or as a true Data Bus test failure. When you run the Data Bus test, Apple TechStep runs the RAM Size test first. If the RAM Size test detects a failure, the Data Bus test displays **FAIL:RAM size** and asks you to press **0** for information. The information screen is the same as for the RAM Size test.

If the RAM size section of the Data Bus test passes, but the Data Bus test itself fails, the screen in Figure 2-27 appears.

```
MacIIsi
Data Bus Test
FAIL:Data Bus
Press 0 for info
```

Figure 2-27 Data Bus Test Failure Screen

Failure of the Data Bus test (assuming the RAM Size test passes) indicates a faulty or misseated SIMM or a bad logic board. Pressing **0** gives information screens in the same format as for the RAM Size test. Figures 2-21, 2-22, and 2-23 show the information screen format.

RAM or (on IIci only) SIMMs – RAM (Standard) Test

Necessary cable: modem
Components under test: soldered RAM (if present) and RAM SIMMs
Log notes: Screen and printed (Report Generator) logs give information about missing, mismatched, or faulty SIMMs—and about faulty soldered RAM. See the RAMsz test description and Figures 2-21, 2-22, and 2-23.

Macintosh IIci computers—screen log format:

```
ROM A Run Err 1↓
RAM   Standard
simA1 1     -
simA2 1     -
```

Macintosh IIsi computers—screen log format:

```
ROM A Run Err 1↓
RAM   Standard
Sldrd 1     1
simm1 1     -
```

Macintosh IIvi, IIvx, and Performa 600 computers—screen log format:

```
ROM A Run Err 1↓
RAM   Standard
Sldrd 1     1
simHM 1     -
```

The word **Sldrd** on the screen refers to soldered (non-SIMM) RAM.

For the SIMM numbering scheme, see RAMsz test description and Figure 2-19.

The Standard RAM test appears on the Logic menu and on the More RAM tests menu (on screen two of the HOME menu). The More RAM tests menu also contains the Extended and Long RAM tests, which may be helpful for finding elusive or intermittent RAM failures.

This test takes approximately four seconds per MB to run. When the test runs in looping mode, the *stop* key terminates the test, but Apple TechStep completes the current loop before stopping. Stopping takes up to 45 seconds for a 10 MB computer.

The RAM test for the Macintosh IIsi, IIvi, IIvx, and Performa 600 computers examines RAM soldered directly to the logic board as well as RAM SIMMs in SIMM slots. The RAM test for the Macintosh IIci computer appears on the menu as **SIMMs** because the IIci has no soldered RAM. Apple Computer has verified the RAM test only using Apple SIMMs but expects that the test will also test third-party SIMMs accurately.

Like all Apple TechStep RAM tests, this test begins by performing the RAM size test and then performs several read-and-write tests of the amount of RAM that the RAM Size test has determined. The Standard test uses the Mod3 / Reverse Mod3 test patterns.

The RAM (Standard) test detects memory failures; missing, mismatched (different sizes in one bank), or faulty SIMMs; and soldered RAM failures (except for the Macintosh IIci computers, which have no soldered RAM).

Figure 2-28 shows sample test result screens.

Pass

```
MacIIsi
RAM:StandardTest
Test PASSED
RAM size: 5MB
```

Fail

```
MacIIsi
RAM:StandardTest
Test FAILED
Press 0 for info
```

Figure 2-28 RAM Test (Standard) Result Screens

If the test fails, the message **Test FAILED** appears, followed by **Press 0 for info**. When you press **0**, the test identifies the bad RAM location—pointing to either soldered RAM (except for Macintosh IIci computers, which contain no soldered RAM) or a particular SIMM slot location.

The failure information screens are in the same format as the RAM size failure screens. For explanations of the screens and what they tell you about RAM failures, see the RAMsz test description and Figures 2-21, 2-22, and 2-23.

Cache – RAM Cache Test (IIvx only)

Necessary cable: modem
Components under test: cache RAM, tag RAM, control 1, control 2
Log notes: VRAM error and extended error messages appear only in the printed (Report Generator) log.
Screen log format:

```
ROM A Run Err 1↓
Cache 1     -
```

Screen log format for VRAM failure (see explanation below):

```
ROM A Run Err 1↓
Cache 1     1  ?
```

The RAM Cache test performs a pattern test and examines read-and-write operation of the RAM cache function on the Macintosh IIvx logic board. The test inspects three major blocks of components:

- Cache (Data) RAM: stores information quickly (a type of memory)
- Tag RAM: determines whether the address accessed by the CPU is in cache memory
- Control: controls operations of the RAM cache

VRAM Failure

Because this test is downloaded from Apple TechStep to the computer's VRAM, you will not be able to test the RAM cache if the VRAM is faulty. Instead you will see the VRAM error screens in Figure 2-29. Press **0** to see the second screen.

The message **VRAM error** appears only in the printed (Report Generator) log. In the screen log, a **1** appears in the **Err** column and a **?** at the end of the line even though the Cache test did not actually run and the Cache RAM may not be faulty. If the Cache RAM test reports a VRAM failure, run the VRAM test on the Logic menu.

```
MacIIvx
RAM Cache Test
FAIL:VRAM error
Press 0 for Info
```

```
Can't test Cache
because VRAM
error occurred!
(Press BACK)
```

Figure 2-29 Cache (Logic) Test VRAM Failure Screen

RAM Cache Test

If the VRAM test and RAM Cache test pass, the screen in Figure 2-30 appears.

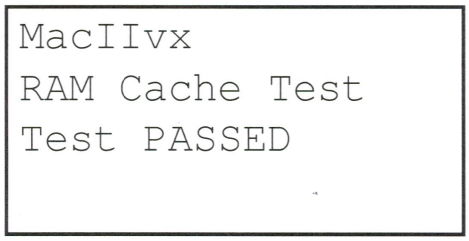


Figure 2-30 RAM Cache Test Result Screen

If the VRAM test passes but the RAM Cache test fails, you will see a screen like the one in Figure 2-31.

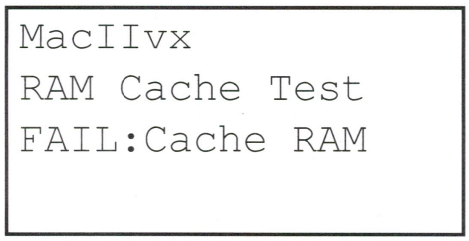


Figure 2-31 RAM Cache Failure Screen

Line three of Figure 2-31 shows one of the RAM Cache extended failure messages. All failure messages are in Table 2-3.

Table 2-3 RAM Cache Test Failure Messages

Message*	Explanation
FAIL:Cache RAM	There is a problem with Cache RAM.
FAIL:Cache Write	The computer is unable to rewrite data to the Cache RAM after a "flush" operation.
FAIL:Cache Read	Apple TechStep cannot read from the computer's Cache RAM.
FAIL:Cache Enable	Apple TechStep cannot disable the computer's Cache RAM.

* These failure messages indicate probable logic board failure.

VIA – Versatile Interface Adapter Test

Necessary cable: modem
Components under test:

Macintosh IIci, IIsi computers: VIA1 IC; VIA2 sections of RBV IC
Macintosh IIvi, IIvx, Performa 600 computers: VIA1 & 2 sections of V8 IC

Figure 2-32 shows a test result screen.

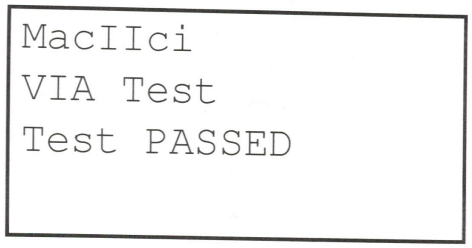


Figure 2-32 VIA Test Result Screen

When complete, the test indicates **PASSED** or **FAILED** and gives a brief explanation. All failure messages indicate a failure in the logic board VIA IC.

RBV – RAM-Based Video IC Test (IIci and IIsi only)

Necessary cable: modem
Components under test: RAM-based video IC
Log notes: Log entry appears on screen and printed (Report Generator).
Screen log format:

The RAM-Based Video IC test examines the RBV IC registers and interrupts. Figure 2-33 shows a results screen for a successful test.

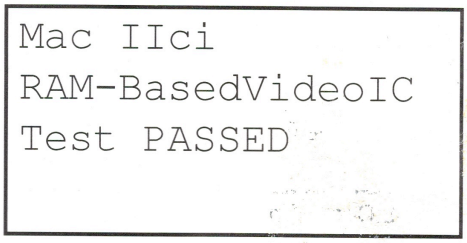


Figure 2-33 RAM-Based Video IC Result Screen

VRMsz – Video RAM Size Measurement (IIvi, IIvx, and Performa 600)

Necessary cable: modem
Components measured: VRAM SIMMs in the two slots on the logic board
Log notes: The video RAM size appears in the print and screen logs.
Screen log format: (If a question mark appears after the VRAM size, the test found a failure.)

```
VRMsz 512KB
```

This test attempts to determine and display the size of VRAM in the CPU.

The Macintosh IIvi, IIvx, and Performa 600 computers require VRAM SIMMs in the two VRAM slots on the logic board. VRMsz is a less-thorough test of VRAM than is the VRAM test. Figure 2-34 shows a test result screen for a computer with functional VRAM. The VRAM size can be 512K or 1 MB.

```
Mac IIvi
Video RAM Size
1 MB
```

Figure 2-34 Video RAM Size Measurement Result Screen

If the VRAM SIMMs are mismatched, or if one or both VRAM SIMMs are bad, the screen in Figure 2-35 appears.

```
Mac IIvi
Video RAM Size
1 MB?
Press 0 for info
```

Figure 2-35 Video RAM Size Measurement Mismatch or Failure Screen

If Apple TechStep cannot find VRAM SIMMs in the VRAM slots, the screen in Figure 2-36 appears.

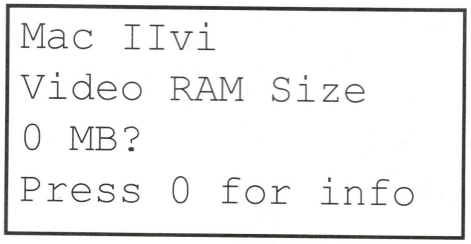


Figure 2-36 Video RAM Size Measurement Screen for No VRAM SIMMs

When you press **0**, the screen in Figure 2-37 appears. In the case of a mismatch, the **x** indicates the smaller VRAM SIMM. In the case of faulty VRAM SIMMs, the **x** indicates a slot that holds a bad VRAM SIMM. The | indicates that a VRAM SIMM is in the slot and that the VRAM SIMM is operational. (For VRAM SIMM locations on the logic board, see Figure 2-19. **L** and **H** refer to addresses, not to markings on the board.)

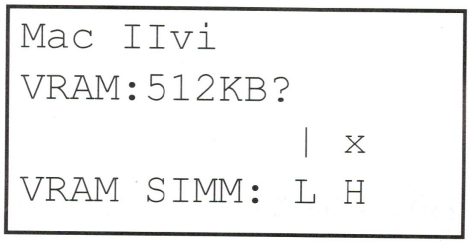


Figure 2-37 VRAM Size Measurement Mismatched or Bad Screen

If Apple TechStep finds no VRAM SIMMs, the screen in Figure 2-38 appears when you press **0**.

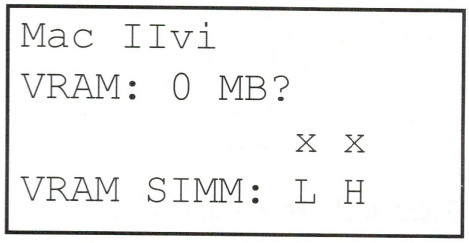


Figure 2-38 Video RAM Size Measurement Result Screen

VRAM – Video RAM Test (IIvi, IIvx, and Performa 600)

Necessary cable: modem

Log notes: The VRAM pass/fail results for each VRAM SIMM appear in the log on a separate line under the test name.

Screen log format:

```
LogA  Run Err
Video RAM Test
simmL   1   -
simmH   1   -
```

The VRAM test measures VRAM size and checks the functioning of the VRAM SIMMs. The VRAM size can be 512K or 1 MB. Figure 2-39 shows a sample test result screen.

```
MacIIvi
Video RAM Test
Test PASSED
512 KB installed
```

Figure 2-39 VRAM Test Result Screen

When complete, the test indicates **PASSED** or **FAILED**.

If the test fails, you can press **0** for more information. You'll see a screen similar to those in Figures 2-40 and 2-41. Figure 2-19 shows the naming convention for VRAM SIMM slots and their position on the logic board. In these figures, the abbreviations are:

L = low-address VRAM SIMM slot
H = high-address VRAM SIMM slot
x = VRAM SIMM is missing or bad
| = VRAM SIMM is present in this slot

```
MacIIvi
VRAM:512KB?
            x   |
VRAM SIMM: L   H
```

Figure 2-40 VRAM Test Information Screen—Faulty VRAM SIMMs

If the VRAM test finds no VRAM SIMMs, the screen in Figure 2-41 appears.

```
MacIIvi
VRAM: 0 MB?
            x   x
VRAM SIMM: L   H
```

Figure 2-41 VRAM Test Information Screen—no VRAM SIMMs

CLUT – Color Look-Up Table IC Test

Necessary cable: modem

Components under test: CLUT DAC (color look-up table digital-to-analog converter) IC on logic board; V8 IC on logic board

Screen log format:

```
ROM A Run Err 1
CLUT  1     1
```

The CLUT (color look-up table) test examines the CLUT IC internal RAM and registers. CLUT failures often produce video display problems. Figure 2-42 shows a test result screen.

```
MacIIvi
Color LookUp Tbl
Test PASSED
```

Figure 2-42 CLUT Test Result Screen

Clock – Clock Test

Necessary cable: modem
Components under test:
- Macintosh IIci: real-time clock (RTC) IC, memory decode unit (MDU), versatile interface adapter (VIA) circuits
- Macintosh IIsi: egret IC, MDU IC, VIA circuits
- Macintosh IIvi, IIvx, Performa 600: egret IC, V8 IC

Log notes: Extended information appears in the print (Report Generator) log.

The Clock test examines the real-time clock (RTC) functions on the logic board. Figure 2-43 shows a successful test result screen.

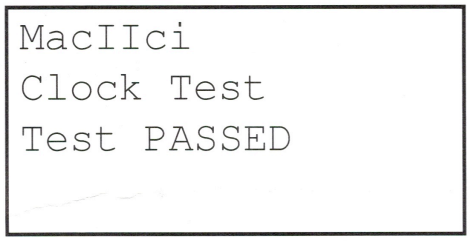


Figure 2-43 Clock Test Result Screen

You may see the failure messages in Table 2-4. For the Macintosh IIci, the failure is in the RTC IC on the logic board. On the Macintosh IIsi, IIvi, IIvx, and Performa 600 computers, the failure indicates a faulty egret IC on the logic board. Before replacing the logic board, always check the test cables and see Chapter 4, Symptom/Action Tables.

The Clock test clears the time and date. When you complete all testing and repairs, use the Control Panel to reset the time and date.

Table 2-4 Clock Test Failure Messages

Message	Explanation
FAIL: NoCtrlrRsp	The ADB (and clock) controller on the logic board failed to respond.
FAIL:CtrlSlfTst1	The ADB (and clock) controller on the logic board failed the self-test.
FAIL:ClockSetTst	The clock-setting test failed.
FAIL:ClkTimeTest	The clock time test failed. The clock failed to keep correct time.
FAIL:ClkRegistrs	The clock registers test failed on the Macintosh IIci computer.
FAIL:ClkIntrrupt	The clock interrupt test failed on the Macintosh IIci computer.

P/RAM – Parameter RAM Test

Necessary cable: modem

Components under test:

Macintosh IIci: real-time clock (RTC) IC, memory decode unit (MDU), versatile interface adapter (VIA) circuits

Macintosh IIsi: egret IC, MDU IC, VIA circuits

Macintosh IIvi, IIvx, Performa 600: egret IC, V8 IC

Log Notes: The test log does not distinguish between the destructive and nondestructive modes of the P/RAM test. Extended failure messages appear only in printed (Report Generator) logs.

When you run the parameter RAM test as part of an All Logic tests selection, Apple TechStep chooses the nondestructive mode.

The Parameter RAM test verifies the parameter RAM on the logic board. The menu provides two modes—destructive and nondestructive. Destructive mode erases all parameter RAM and resets most control panels to default values. The nondestructive test saves pretest settings and restores the settings

when testing is complete. When you select P/RAM from the Logic menu, the mode selection menu in Figure 2-44 appears.

```
P/RAM Test
1-NonDestructive
2-Destructive
```

Figure 2-44 Parameter RAM Menu

Nondestructive Mode

Press **1** to run the P/RAM test in the nondestructive mode. Figure 2-45 shows a successful test result screen for the Nondestructive P/RAM test mode.

```
MacIIsi
Parameter RAM
Test PASSED
P/RAM not erased
```

Figure 2-45 Nondestructive P/RAM Test Result Screen

Pressing *back* when you see the test result screen returns you to the Parameter RAM test menu. Press *back* again to return to the Logic menu.

Table 2-5 lists the failure messages for the Nondestructive P/RAM test. All three messages indicate a faulty logic board.

Table 2-5 Nondestructive P/RAM Test Failure Messages

Message	Explanation
[illegible]: NoCtrlrRsp	The ADB (and PRAM) controller on the logic board failed to respond on the Macintosh IIsi, IIvi, IIvx, or Performa 600 computer.
FAI[illegible]CtrlSlfTst1	The ADB (and PRAM) controller on the logic board failed the self-test on the Macintosh IIsi, IIvi, IIvx, or Performa 600 computer.
FAIL:M[illegible] test	The P/RAM Pattern test failed.

If Apple TechStep detects a failure, Apple TechStep cannot determine the erased/not-erased status of parameter RAM; the message **P/RAM not erased** in Figure 2-45 will not appear on-screen. If the nondestructive P/RAM test fails, parameter data may have been corrupted.

Destructive Mode

If you select the destructive P/RAM test, be sure to reset the mouse, sound volume, insertion point blink rate, RAM cache, menu blink rate, and auto-key repeat settings when you complete testing and repairs.

Figure 2-46 shows a successful test result screen for the destructive parameter RAM test.

```
Mac IIsi
Parameter RAM
Test PASSED
P/RAM erased
```

Figure 2-46 Destructive P/RAM Test Result Screen

Pressing *back* when you see the test results screen returns you to the P/RAM menu. Press *back* again to return to the Logic menu.

For the Destructive P/RAM test, you may see the failure messages in Table 2-6. All five messages indicate a faulty logic board.

Table 2-6 Destructive P/RAM Test Failure Messages

Message*	Explanation
FAIL:NoCtrlrRsp	The ADB (and PRAM) controller on the logic board failed to respond on the Macintosh IIsi, IIvi, IIvx, or Performa 600 computer.
FAIL:CtrlSlfTst	The ADB (and PRAM) controller on the logic board failed the self-test on the Macintosh IIsi, IIvi, IIvx, or Performa 600 computer.
FAIL:Memory test	The ROM-based P/RAM test failed.
FAIL:P/RAM init.	P/RAM did not reinitialize successfully. P/RAM erasure failed.
FAIL:PatternTest	P/RAM pattern test failed.

* These failure messages indicate probable logic board failure.

If Apple TechStep detects a failure, the erased/not-erased status of parameter RAM is uncertain; the P/RAM erased message in Figure 2-46 will not appear on-screen.

ADB (Logic) – ADB Logic Test

Necessary cables: ADB1, ADB2 (except IIsi), and modem
Components under test: ADB transceivers, ADB lines, ADB ports, and portions of the VIAs that control the ADB
Screen log format:

```
ADB    1    -
```

Figure 2-47 shows a sample test result screen.

```
MacIIsi
ADB Test
Test PASSED
```

Figure 2-47 ADB (Logic) Test Result Screen

When complete, the test indicates **PASSED** or **FAILED**. Table 2-7 shows extended failure messages that appear on the test result screen.

Table 2-7 ADB Logic Test Failure Messages

Message	Explanation	Probable Cause*
Test PASSED CPU is ON.	Power-up line is OK (4.0-5.49 V) **and** ADB +5 V line is OK (4.8-5.24 V).	No problem.
FAIL:No power ADB cable?	Power-up line is low (<2.0 V) **and** ADB+5V line is off (0-1.99 V).	**1)** ADB cable may be missing or loose. 2) Computer AC power cable may be missing or loose. 3) On Macintosh IIsi, IIvi, IIvx, and Performa 600 computers, check battery. 4) Power supply may be faulty.
FAIL:PowerUpKeyV	Power-up line is low (0-3.99 V) **but** ADB +5 V line is OK (4.8-5.24 V).	1) ADB cable may be defective. 2) Logic board may be faulty. 3) Power supply may be faulty.
FAIL:+5V Line CPU is off?	Power-up line is OK (4.0-5.49 V) **but** ADB +5 V line is off (0-1.99 V).	**1)** Check that computer is switched on. 2) Logic board ADB fuse may be blown. Wait one minute and retest. If test passes, fuse has repaired itself. If test fails again, fuse is not repairing itself and logic board must be replaced. 3) Logic board may be faulty.
FAIL:+5V Line	Power-up line is OK (4.0-5.49 V) **but** ADB +5 V line is low (2.0-4.79 V).	1) Logic board ADB fuse may be blown. Wait one minute and retest. If test passes, fuse has repaired itself. If test fails again, fuse is not repairing itself and logic board must be replaced. 2) Logic board may be faulty. 3) Power supply may be faulty.
FAIL:+5v,PwUpKey Power supply?	Power-up voltage is low or high (<4.0 V or >5.49 V) **and** ADB +5 V line is off, low, or high (<4.8 V or >5.24 V).	1) Logic board ADB fuse may be blown. Wait 1 minute and retest. If test passes, fuse has repaired itself. If test fails again, fuse is not repairing itself and logic board must be replaced. 2) Logic board may be faulty. 3) Power supply may be faulty.

* When using numbered steps, always retest before performing the next step.

Table 2-7 ADB Logic Test Failure Messages (con't.)

Message	Explanation	Probable Cause*
FAIL:PowerUpKeyV Power supply?	Power-up voltage is high (>5.49 V) **but** ADB +5 V line is OK (4.8-5.24 V).	1) Cables. 2) Power supply.
FAIL:+5V Line Power supply?	Power-up line is OK (4.0-5.49 V) **but** ADB +5 V line is high (>5.25 V).	1) Cables. 2) Power supply.
FAIL:NoCtrlrRsp	The ADB controller on the logic board failed to respond.	Logic board.
FAIL:CtrlSlfTst1	The ADB controller on the logic board failed the self-test.	Logic board.
FAIL:ADB intrrpt	The Macintosh IIci ADB controller on the logic board failed to send an interrupt.	Logic board.
FAIL:ADB1transmt	The ADB transmitter connected to Apple TechStep port 1 failed because of a voltage, timing, or message mismatch.	Logic board.
FAIL:ADB1receive	The ADB receiver connected to Apple TechStep port 1 failed because of a message mismatch.	Logic board.
FAIL:ADB2transmt	The ADB transmitter connected to Apple TechStep port 2 failed because of a voltage, timing, or message mismatch.	Logic board.
FAIL:ADB2receive	The ADB receiver connected to Apple TechStep port 2 failed because of a message mismatch.	Logic board.

* When using numbered steps, always retest before performing the next step.

SCC – Serial Communication Test

Necessary cables: modem and printer

Components under test:

Macintosh IIci: SCC IC

Macintosh IIsi, IIvi, IIvx, and Performa 600: Combo IC (SCSI and serial communications controller IC)

Log notes: Detailed failure messages appear only in print (Report Generator) log.

Screen log format.

```
ROM A Run Err 1
SCC   1     1
```

The SCC test checks the serial communications controller. The test examines all modes, verifies that the serial interfaces send (TxD line) and receive (RxD line) data correctly, and confirms that the handshake lines (HSKi, HSKo, and GPi) work.

Because of the nature of the SCC test, this test does not cease immediately after you press the *stop* key. The test may take a minute to stop.

If the test does not pass, the screen in Figure 2-48 appears. Line three indicates which signal line of which port (printer or modem) failed, or whether the SCC components failed. Failure messages are in Table 2-8.

```
MacIIsi
SCC Test
FAIL:Modem (HSKi)
```

Figure 2-48 SCC Test Results Screen

Table 2-8 SCC Test Failure Messages

Message*	Explanation
FAIL:IC/board	The register or internal loopback test failed.
FAIL:Modem (HSKi)	The handshaking signal (HSKi) from Apple TechStep via the computer modem port was not detected.
FAIL:Modem (HSKo)	The handshaking signal voltages (HSKo) to Apple TechStep from the Macintosh computer via the modem port are out of tolerance.
FAIL:Modem (RXD)	Data that the computer sent via the modem port (RXD) to Apple TechStep was not received by Apple TechStep or was bad.
FAIL:Modem (TXD)	The data that Apple TechStep sent to the computer via the modem port (TXD) was not received or was bad.
FAIL:Modem (GPi)	The GPi handshaking signal via the modem port was not detected.
FAIL:Prntr (HSKi)	The handshaking signal (HSKi) from Apple TechStep via the computer printer port was not detected.
FAIL:Prntr (HSKo)	The handshaking signal voltages (HSKo) to Apple TechStep from the Macintosh computer via the printer port is out of tolerance.
FAIL:Prntr (RXD)	Data that the computer sent via the printer port (RXD) to Apple TechStep was not received by Apple TechStep or was bad.
FAIL:Prntr (TXD)	The data that Apple TechStep sent to the computer via the printer port (TXD) was not received or was bad.
FAIL:Prntr (GPi)	The GPi handshaking signal via the printer port was not detected by Apple TechStep.
FAIL:unknown	Apple TechStep could not understand the failure code returned by the computer.

* These failure messages indicate probable logic board failure.

SCSI – SCSI Logic Test

Necessary cables: modem and SCSI
Components under test:

Macintosh IIci: SCSI IC on the logic board.

Macintosh IIsi, IIvi, IIvx, and Performa 600: Combo IC (SCSI and serial communications controller IC) on the logic board. The SCSI (Logic) test also verifies that the SCSI bus can send and receive data correctly.

Log notes: Detailed failure messages appear in print (Report Generator) log.
Screen log format:

```
ROM A Run Err 1
SCSI  1     1
```

Figure 2-49 shows a sample SCSI (Logic) test result.

```
MacIIsi
SCSI Logic Test
Test PASSED
```

Figure 2-49 SCSI Logic Test Result Screen

Note

The SCSI test requires a SCSI cable in addition to the modem cable. You must connect the SCSI cable regardless of whether you want to use automatic Test Manager entry.

When complete, the test indicates **PASSED** or **FAILED**. Extended failure messages appear on line three. (Refer to Table 2-9 for an explanation of failure messages.) Most of these messages indicate failures in a particular SCSI line . The *Apple Service Guide for Peripheral Interfaces* may help identify these SCSI lines. On the module level, the fault could be the cables, the port, the logic board, or the terminator. In the event of a failure, run the SCSI Functions from the HOME menu before you make a diagnosis.

Table 2-9 SCSI Logic Test Failure Messages*

Message	Explanation
FAIL: Register	SCSI test has failed to read and write valid data to the computer's SCSI IC registers.
FAIL: BSY line	The SCSI BSY line failed to respond correctly.
FAIL: SEL line	The SCSI SEL line failed to respond correctly.
FAIL: C/D line	The SCSI C/D line failed to respond correctly.
FAIL: I/O line	The SCSI I/O line failed to respond correctly.
FAIL: MSG line	The SCSI MSG line failed to respond correctly.
FAIL: REQ line	The SCSI REQ line failed to respond correctly.
FAIL: ACK line	The SCSI ACK line failed to respond correctly.
FAIL: ATN line	The SCSI ATN line failed to respond correctly.
FAIL:DataHandlng	SCSI data handling between Apple TechStep and the computer failed.
FAIL: Walking 0's	SCSI data pattern rotating of a "0" through the computer SCSI lines failed.
FAIL: Walking 1's	SCSI data pattern rotating of a "1" through the computer SCSI lines failed.
FAIL: Data Parity	During SCSI pattern testing a parity error was detected.
FAIL:UnknownErr	The cause of the test failure is unknown.

* To determine the cause of SCSI Logic Test failures, check the SCSI connector, the SCSI cabling, and then the logic board. Always retest before checking the next possible cause.

SWIM – SWIM IC Test

Necessary cable: modem
Components under test:
Macintosh IIci, IIsi: memory decode unit (MDU) and SWIM IC
Macintosh IIvi, IIvx, Performa 600: SWIM IC, V8 IC

The SWIM test examines the SWIM IC on the logic board. The SWIM IC controls the floppy drive. Figure 2-50 shows a sample test result. The test indicates **PASSED** or **FAILED**.

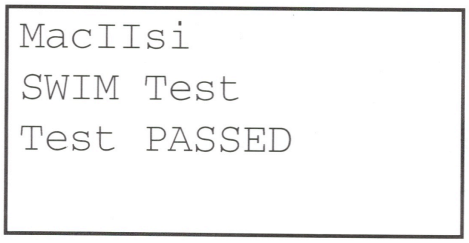


Figure 2-50 SWIM Test Results Screen

This test detects only a catastrophic failure in the SWIM IC on the logic board. The Floppy Drive test provides a more comprehensive test of the SWIM IC and the floppy drive(s).

FPU – Floating-Point Unit IC Test (IIci and IIvx only)

Necessary cable: modem
Components under test: FPU IC soldered on logic board
Log notes: Detailed failure messages appear only in print (Report Generator) log. Screen log is Run/Err format.

The FPU test is part of the logic menu for the Macintosh IIci and IIvx computers, because for these computers, the FPU IC is soldered on the logic board. On these computers the FPU is not an option—a logic board without an FPU is faulty. Figure 2-51 shows the screen of a successful test result.

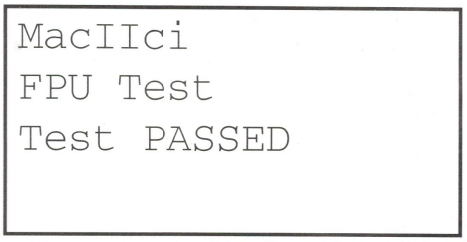


Figure 2-51 Successful FPU Test Results Screen

Figure 2-52 shows the message screen for a noncatastrophic failure (that is, Apple TechStep senses that the FPU is present but faulty).

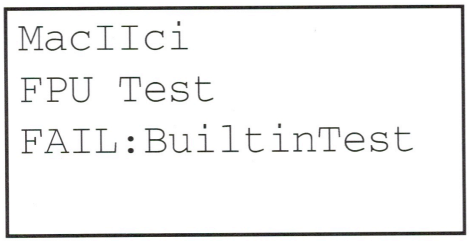


Figure 2-52 FPU Noncatastrophic Failure Test Results Screen

Figure 2-53 shows the screen that appears if Apple TechStep cannot find an FPU IC. (This probably indicates a total failure of the FPU.)

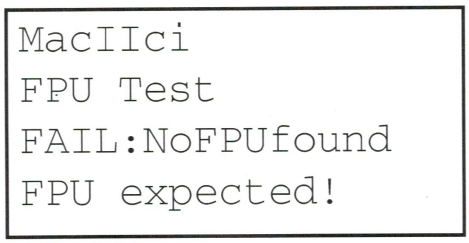


Figure 2-53 FPU Test Failure Results Screen

Sound – Sound Test

Necessary cables: modem and audio
Components under test:

- Macintosh IIvi, IIvx, and Performa 600 computers: V8 IC on the logic board, DFAC IC on the logic board, egret IC on the logic board (partial), sound output amplifier
- Macintosh IIsi and IIci computers: Apple Sound Chip (ASC) IC on the logic board

The sound test verifies that the registers on the ASC IC or on the sound portion of the V8 IC (both ICs are soldered to the logic board) function correctly and that the computer can read data from and write data to, the sound IC. The test also measures the sound output for volume and frequency. Figure 2-54 shows a successful test result screen.

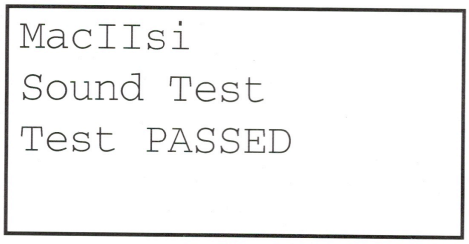


Figure 2-54 Sound Test Successful Screen

Figure 2-55 shows a test failure screen.

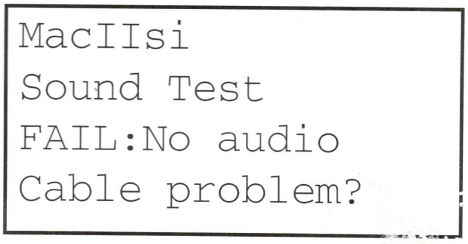


Figure 2-55 Sound Test Failure Screen

Table 2-10 shows failure messages that may appear for the Sound Test.

Table 2-10 Sound Test Failure Messages

Message	Explanation	Probable Cause*
FAIL: No Audio	No audio signal. The sound-out cable, sound-out jack, or logic board is faulty.	1) Sound (out) cable 2) Logic board
FAIL: Freq low	Frequency lower than expected.	1) Sound (out) cable 2) Logic board
FAIL: Freq high	Frequency higher than expected.	1) Sound (out) cable 2) Logic board
FAIL: Ampl high	Amplitude higher than expected.	1) Sound (out) cable 2) Logic board
FAIL: Ampl low	Amplitude lower than expected.	1) Sound (out) cable 2) Logic board
FAIL: ASC Bad	The Apple sound circuitry failed.	Logic board
FAIL: Registers	The ROM-based Sound Register test failed.	Logic board
FAIL: Interrupts	The ROM-based Sound Interrupts test has failed.	Logic board

* When using numbered steps, always retest before performing the next step.

The Sound test is the last test in the Logic menu. At this point we return to the Home menu tests.

Cache – Cache Card Test (IIci only)

Necessary cable: modem
Components under test: optional Cache card in Macintosh IIci computers
Log notes: Extended error messages appear only in the printed (Report Generator) log.

Figure 2-56 shows a screen for a successful Cache Card test.

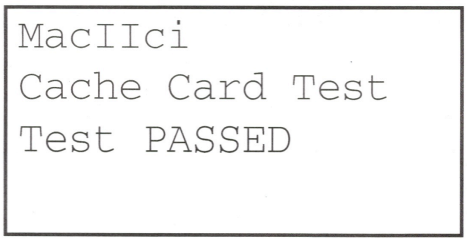


Figure 2-56 Cache (Card) Test Result Screen

If the test fails, you will see one of the error messages in Table 2-11.

Table 2-11 Cache Card Test Failure Messages

Message	Explanation	Probable Cause*
FAIL: Tag Memory	A RAM failure occured in the Cache card "Tag" memory.	Cache card
FAIL: Data Memory	A RAM failure occured in the Cache card "Data" memory.	Cache card
FAIL: NoCardFound	No Cache card was detected.	1) Cache card not present 2) Cache card not seated properly 3) Cache card
FAIL: Cache Enable	Test could not "enable" the Cache card.	Cache card

* When using numbered steps, always retest before performing the next step.

FPU – Floating-Point Unit IC Test (IIvi and Performa 600 only)

Necessary cable: modem
Components under test: optional FPU IC in a socket on logic board of the Macintosh IIvi and Performa 600 computers
Log notes: Detailed failure messages appear only in print (Report Generator) log. Screen log is Run/Err format.

The FPU test is part of the HOME menu for the Macintosh IIvi and Performa 600 computers, because for these computers, the FPU IC is an option that may or may not be present in a socket on the logic board. On these computers, a logic board without an FPU IC is not necessarily faulty. Apple TechStep

detects two conditions—a missing FPU (option not exercised) and a FPU that is present but faulty.

Figure 2-57 shows the screen of one type of successful test result—the FPU is present and operational.

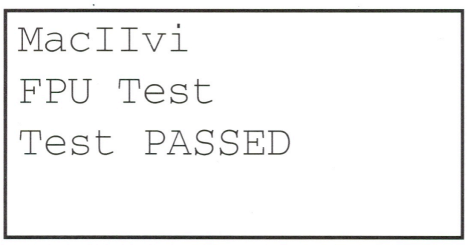


Figure 2-57 FPU Test Results Screen—Present and Functional

When Apple TechStep detects the FPU IC but the IC is faulty, you see the screen in Figure 2-58.

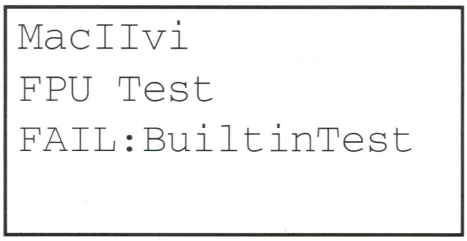


Figure 2-58 FPU Test Results Screen—Present but Faulty

Figure 2-59 shows the screen that appears if Apple TechStep cannot find an FPU IC or if the IC is so faulty that Apple TechStep cannot detect the IC. If you see this message, open the computer and inspect the logic board. If the FPU is present, swap the FPU. If the FPU is missing, the FPU option has not been exercised. Install an FPU if you wish; otherwise, an empty FPU slot means no fault has been found.

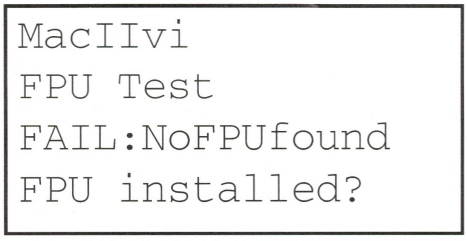


Figure 2-59 FPU Test Results Screen—FPU Absent

Floppy Drive(s) – Floppy Drive Test

Necessary cable: modem

Components under test: SWIM IC on the logic board, VIA IC on the logic board, floppy drive

Log notes: Numerical error messages appear in print (Report Generator) log but not in screen log. Non-numerical failure information appears in Press 0 screen but not in either log.

Screen log format:

```
ROM A Run Err
1.4#1 1    1
```

The "name" of the test in the log is a combination of the drive format chosen (1.4 MB, 720K, or 800K) plus the number of the drive (#1, #2). Thus **1.4#1** refers to the 1.4 MB drive test run on drive #1. The Floppy Drive test verifies the drive's ability to read, write, and seek.

SWIM IC Check

The Floppy Drive test provides a more thorough check of the SWIM IC on the logic board than does the SWIM test in the Logic menu. Because the SWIM IC controls the floppy drive and parts of the VIA (versatile interface adapter) circuitry, a Floppy Drive test failure may indicate a SWIM problem rather than a drive problem.

Running the Floppy Drive Test

Macintosh IIci and IIsi computers have one, two, or no floppy drives. When you choose the Floppy Drive test, Apple TechStep scans the computer and displays a menu of the installed drives. Figure 2-60 shows a Floppy Drive test menu window.

```
Which drive?
1+Dr.1: 1.4MB
2+Dr.2: 800K
```

Figure 2-60 Selection Screen for Macintosh IIci and IIsi Computers

Macintosh IIvi, IIvx, and Performa 600 computers have only one floppy drive. Figure 2-61 shows the test menu.

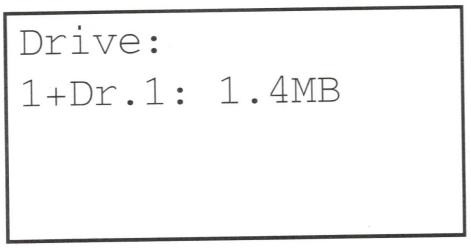


Figure 2-61 Selection Screen for Macintosh IIvi, IIvx, and Performa 600 Computers

When you choose a drive from the Drive test menu, the test first attempts to eject any floppy disk in the drive.

For an Apple SuperDrive, the test then asks the user to specify which drive format to test, as Figure 2-62 shows.

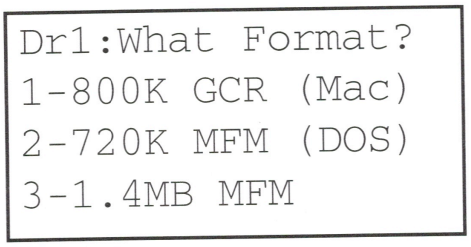


Figure 2-62 Floppy Drive Selection Screen

Apple TechStep tests 800K drives in 800K GCR (group-coded recording) format. Apple TechStep tests the Apple SuperDrive in 800K GCR, 1.4 MB MFM (modified frequency modulation), or 720K MFM (MS-DOS®) format. Apple recommends testing all three formats on the Apple SuperDrive.

Testing Problems

The screens in Figure 2-63 notify you of problems in running the test. If you see one of these screens, it may indicate a problem with the test diskette. Make sure you are using a write-enabled known-good floppy disk of the proper size and capacity. If the malfunction persists, the floppy drive switch mentioned is probably at fault.

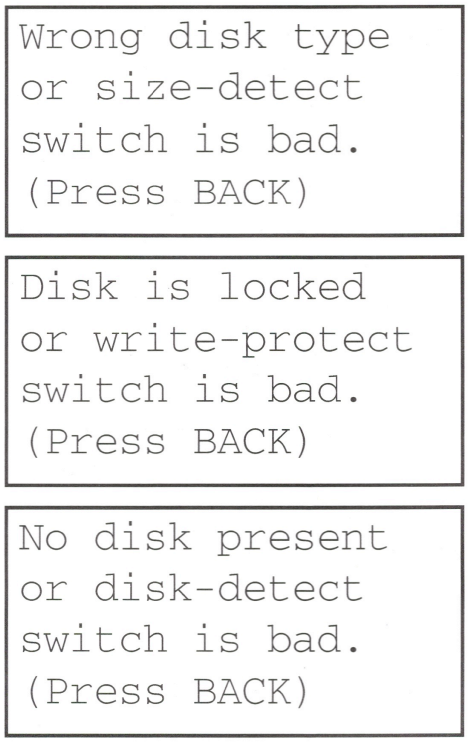


Figure 2-63 Floppy Drive Test Problem Screens

Failure Messages

If all the drive checks shown above pass, Apple TechStep proceeds with a series of drive tests. If a test fails, you see a message similar to the one in Figure 2-64.

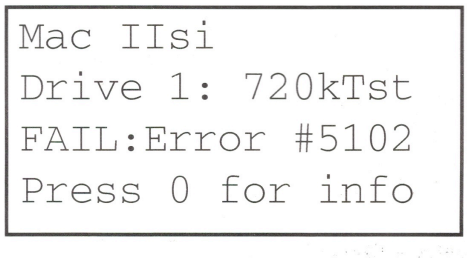


Figure 2-64 Floppy Drive Test Failure Screen

Pressing **0** yields the information screen in Figure 2-65. Lines three and four tell which of the individual tests failed. If line four shows the screen message **Drive OR Media**, the test disk may have caused the failure. Test again with a known-good floppy disk. If the test fails again, the drive is probably faulty.

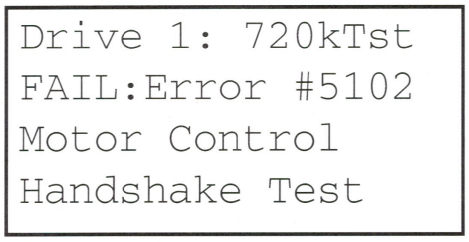


Figure 2-65 Failure Information Screen

Table 2-12 explains the failure codes given by the test. (The **xx** in the error code refers to the part of the subtest that failed.)

- Error codes 21xx through 38xx indicate a drive mechanism failure.
- Error codes 42xx through 56xx indicate a drive mechanism error or a media failure.

Fault Isolation

If testing with known-good drives does not solve the problem—or, in a two-drive computer, if neither drive works—the logic board is probably at fault.

Table 2-12 Floppy Drive Test Error Codes

Error Code	Explanation	Probable Cause*
21xx	Motor control handshake test failed.	Floppy drive
22xx	Recalibration test failed.	Floppy drive
24xx	Rapid head step test failed.	Floppy drive
26xx	Head overstep test failed.	Floppy drive
31xx	Mode change timing test failed.	Floppy drive
32xx	Step time test failed.	Floppy drive
33xx	Motor speed change time test failed.	Floppy drive
34xx	GCR motor start timing test failed.	Floppy drive
35xx	800K speed test failed.	Floppy drive
37xx	720K speed test failed.	Floppy drive
38xx	1.4 MB speed test failed.	Floppy drive
42xx	800K format test failed. (Either the drive is bad, or the test disk is faulty.)	Floppy drive
43xx	800K read/write test failed. (Either the drive is bad, or the test disk is faulty.)	Floppy drive
51xx	720K format test failed. (Either the drive is bad, or the test disk is faulty.)	1) Disk 2) Floppy drive
52xx	1.4 MB format test failed. (Either the drive is bad, or the test disk is faulty.)	1) Disk 2) Floppy drive
53xx	720K read/write test failed. (Either the drive is bad, or the test disk is faulty.)	1) Disk 2) Floppy drive
54xx	1.4 MB read/write test failed. (Either the drive is bad, or the test disk is faulty.)	1) Disk 2) Floppy drive
55xx	720K write test failed. (Either the drive is bad, or the test disk is faulty.)	1) Disk 2) Floppy drive
56xx	1.4 MB write test failed. (Either the drive is bad, or the test disk is faulty.)	1) Disk 2) Floppy drive
Unknown error	The test returned an invalid error code.	Floppy drive

Built-in Video Menu

This menu provides two selections: Monitor ID and Video Patterns.

Monitor ID – Monitor Identification Function

Necessary cables: modem, video cable between computer and monitor

Components under test: V8 IC (IIvi, IIvx, Performa 600 only), external video port connector (15-pin), monitor, monitor cable

Log notes: This test appears in the Report Generator (printed) and screen logs as **monID**.

Screen log format:

```
ROM A Run Err 1↓
MonID 6:MacHiRes
```

Figure 2-66 shows a typical monitor ID result screen.

```
MacIIsi
Monitor ID
ID#6:MacHiRes
```

Figure 2-66 Monitor ID Result Screen

Line three of Figure 2-66 shows one of the following monitor types:

ID#1	Portrait	Apple Macintosh Portrait Display
ID#2	12" RGB	Macintosh 12-Inch RGB Display
ID#3	VGA	Video graphics array monitor
ID#5	Portrait	Apple Macintosh Portrait Display
ID#6	MacHiRes	Macintosh Color Display, AppleColor High-Res. RGB Monitor, Apple High-Res. Mono. Monitor

You may also see the following messages:

ID:?	Unknown	TechStep could not identify the monitor.
ID#X	NotFound	TechStep could not find a monitor.
ID#0	LgBdFAIL	The monitor detection circuit on the logic board failed.

Video Patterns – Video Patterns Function

Necessary cables: modem, video cable between computer and monitor
Components under test:

Macintosh IIci, IIsi: RBV, external video port connector (15-pin), monitor, monitor cable

Macintosh IIvi, IIvx, Performa 600: V8 IC, external video port connector (15-pin), monitor, monitor cable, VRAM SIMMs

Log notes: This function does not appear in the screen log or Report Generator (printed) log.

Video Patterns allows you to display a screen pattern on the monitor. This pattern allows you to visually verify that the video circuitry functions.

Check of VRAM and Monitor

Before displaying the pattern, the Video Patterns function runs a preliminary check of monitor and video circuitry and tells you if no monitor is attached. It also checks to see if VRAM or system RAM for video is missing or insufficient.

Macintosh IIci and IIsi computers

Instead of VRAM SIMMs, the Macintosh IIci and IIsi computers use bank A of computer RAM for built-in video functions. Figure 2-67 shows the screen that appears if bank A is missing:

```
No RAM found!
Test requires
system RAM.
(Press BACK)
```

Figure 2-67 Video Patterns – VRAM Error Message for Macintosh IIci and IIsi Computers

If you see the screen in Figure 2-67 on a Macintosh IIci or IIsi computer, the RAM SIMMs in bank A may be faulty or missing. Run the RAM Size and RAM (Standard) tests and follow the directions in the test descriptions. (If no SIMMs are present in bank A, the built-in video port cannot be used.)

On a Macintosh IIsi, bank A RAM is soldered onto the logic board— therefore, a bank A RAM failure on a Macintosh IIsi is considered a logic board fault.

Macintosh IIvi, IIvx, and Performa 600 computers

Macintosh IIvi, IIvx, and Performa 600 computers use VRAM SIMMs in VRAM logic board slots. See Figure 2-19 for the locations on the logic board. Total VRAM size must be 512K or 1MB. Figure 2-68 shows the screen that appears if VRAM is missing from a Macintosh IIvi, IIvx, or Performa 600 computer.

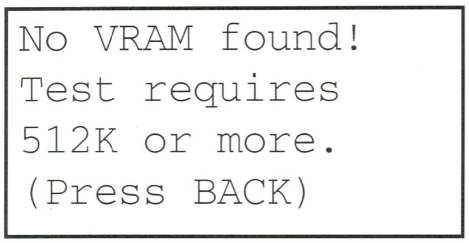


Figure 2-68 Video Patterns – VRAM Error Message for Macintosh IIvi, IIvx, and Performa 600 Computers

Monitor undetected

If Apple TechStep does not detect a monitor, the screen in Figure 2-69 appears.

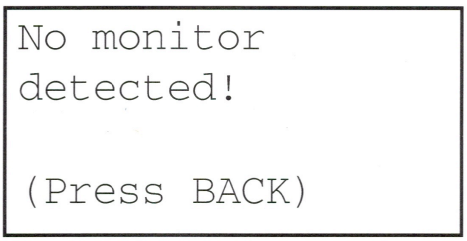


Figure 2-69 Video Patterns – No Monitor Detected

Video Patterns

Figure 2-70 shows the Video Patterns menu. The screen messages **1-bit** and **4-bit** indicate the amount of information that defines each pixel on the display. In 1-bit video, each pixel is black or white (as on the Macintosh Plus display). 4-bit video allows pixels in color or shades of gray. Press [illegible] to return to the Built-in Video menu.

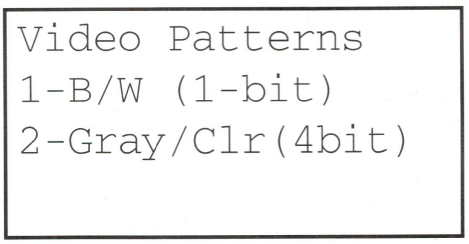


Figure 2-70 Video Patterns Menu

If you choose **1**, the screen in Figure 2-71 appears. If you choose **2** on the Macintosh IIci or IIsi computers, the screen in Figure 2-72 appears. If you choose **2** on the Macintosh IIvi, IIvx, or Performa 600 computers, the screen in Figure 2-73 appears.

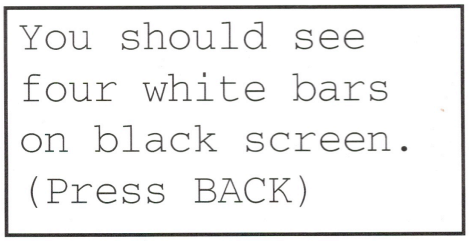


Figure 2-71 Black-and-White Pattern Message

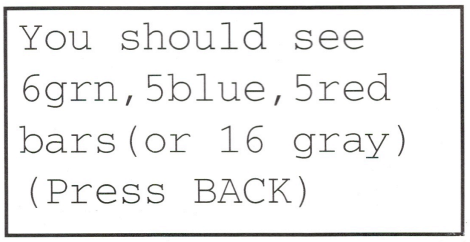


Figure 2-72 Gray/Color Pattern Message for Macintosh IIci and IIsi Computers

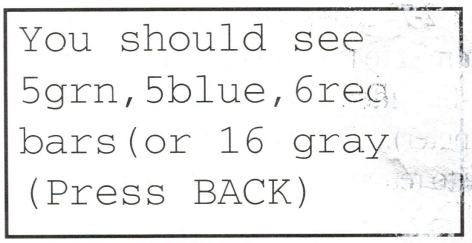


Figure 2-73 Gray/Color Pattern Message for Macintosh IIvi, IIvx, and Performa 600 Computers

Evaluating the Patterns

Visually compare the monitor display to the Apple TechStep descriptions. Be aware of the following idiosyncrasies:

- The red may appear magenta on a normal monitor.
- On the Macintosh IIci and IIsi computers, lines sometimes appear on the monitor display as tests run. Test Manager interaction with the computer built-in video causes the lines.
- On the Apple High-Resolution Monochrome Monitor, the leftmost two to four bars of the 16 gray bars appear as a solid block of black.

NuBus Cards – NuBus Card Scan Function/Video Card Test (IIci, IIvi, IIvx, and Performa 600 only)

For NuBus card information for Macintosh IIsi computers, see the Expansion Slot selection of the HOME menu.

Necessary cable: modem

Components scanned: Provides IDs of all Apple and some third-party NuBus™ cards. Provides a VRAM size measurement and a VRAM test of all Apple NuBus video cards. Tests static RAM (SRAM) soldered to 8•24 GC cards.

Log notes: Results of the NuBus scan do not appear in the screen or print (Report Generator) logs. Results of the NuBus Video Cards test appear in both test logs.

Screen log format for NuBus video cards VRAM test:

```
MacII Video Card
SdRAM 1   -
ram1B 1   -
ram1C 1   -
```

```
4•8 / 8•24 VidCd
Bank0  1   -
J3/1H  1   -
J4/1L  1   -
```

```
824GC Video Card
VRAM  1   -
SRAM  1   -
J3    1   -
```

The NuBus Card Scan function examines the NuBus card slots in the computer and creates a menu similar to the menu in Figure 2-74.

The selection numbers in Figure 2-74 correspond to the logic board NuBus slot numbers. Number 1 is the NuBus slot on the extreme left of the computer when you face the front, the next slot from the left is number 2, etc. The Macintosh IIci, IIvi, IIvx, and Performa 600 have three NuBus slots. If no card is present, **no card found** appears after the selection number.

```
MacIIci NuBus
1-TokenTalkNB
2-HiRes Video Cd
3-No card found
```

Figure 2-74 Sample NuBus Scan Menu Screen

The following messages may appear instead of card names:

No card found = no card found in the slot
Other Card = a non-Apple card found
Unknown Card = a card without an ID code found

Non-Apple card names do not appear in the menu. Apple TechSte provide RAM tests for non-Apple cards.

If you choose **3** in Figure 2-74, the screen in F

aci

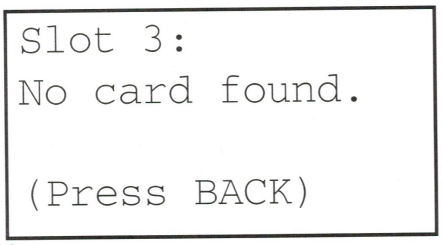


Figure 2-75 NuBus Scan Menu Screen

Nonvideo Card ID Function

Results of the nonvideo card identification function do not appear in the screen or printed (Report Generator) logs.

When you press the selection number of a nonvideo NuBus card, a screen similar to the one in Figure 2-76 appears. Line three shows the revision level from the card configuration ROM. Apple TechStep identifies but does not test nonvideo cards.

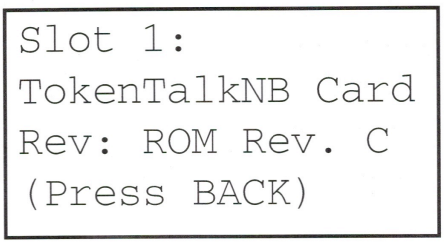


Figure 2-76 Sample Nonvideo Card Info Screen

When you press *back*, the screen in Figure 2-74 reappears.

2-13 shows names of the nonvideo NuBus cards that could appear in the n Figures 2-74 and 2-76.

Table 2-13 Nonvideo NuBus Cards

Name on Screen	Apple Product Name	Apple Service Part Number
PC Drive	Macintosh II PC Drive Card (Macintosh PC 5.25 Drive Card)	661-0407
Bus Master	Macintosh II Bus Master Card	077-8264
Coax/Twinax	Macintosh II Apple Coax /Twinax Card	661-0458
Ethernet NB	Macintosh II Apple Ethernet NB Card	661-0619
EtherTalk	Macintosh II Apple EtherTalk Card Macintosh II Apple EtherTalk NB Card	661-0414 661-0496
ISDN NB	Macintosh II ISDN NB Card	661-0620
Serial NB	Macintosh II Apple Serial NB Card	661-0517
TokenRing NB	Macintosh II Token Ring 4/16 NB Card	661-1617
TokenTalk NB	Macintosh II TokenTalk NB Card	661-0460

Video Card Tests

Apple TechStep performs a VRAM test on any NuBus video card from the menu in Figure 2-74.

Apple TechStep tests the video cards listed in Table 2-14, however Apple TechStep cannot distinguish between Display Cards. Thus the test for either card **VidCd**.

Table 2-14 Video NuBus Cards

Name on Screen	Apple Product Name	Apple Service Part Number	ROM Part Number
MacII Video Card	Macintosh II Video Card	661-0376 661-0492	342-0008
2page Video Card	Macintosh II Two-Page Monochrome Video Card	661-0456	341-0801
Prtrt Video Card	Mac II Portrait Display Video Card	661-0586 661-0587 661-0604	341-0732
HiRes Video Card	Macintosh II High-Resolution Display Video Card	661-0493	341-0660
Mono Video Card	Macintosh II Monochrome Video Card, 1-Bit	661-0518	341-0668
4•8 or 8•24VidCd	Macintosh Display Card 4•8 **or** Macintosh Display Card 8•24	661-0607 661-0677 or 661-0608 661-0678	341-0801 341-0868* 341-0801 341-0868*
824GC Video Card	Macintosh Display Card 8•24	661-0606 661-1642	341-0812 341-0266**

*341-0868 provides white correction for the Macintosh 21" Color Display.
**341-0266 is necessary to run a Macintosh 16" Color Display.

As the test runs, you see a screen similar to the one in Figure 2-77 with an activity indicator in the upper-right corner.

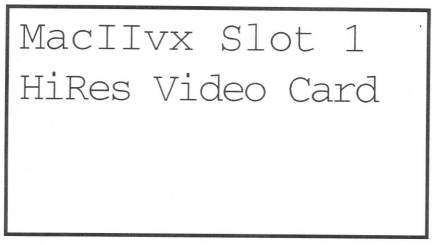


Figure 2-77 NuBus Scan Video Test In-Progress Screen

If the test passes, you see a screen similar to the one in Figure 2-78. The RAM size is shown at the beginning of line four. The last four spaces in line four show the four digits of the Apple Service Part Number for the video card. Table 2-14 shows service part numbers.

Figure 2-78 NuBus Scan Video Test-Passed Screen

If Apple TechStep detects a failure, a screen like that in Figure 2-79 appears.

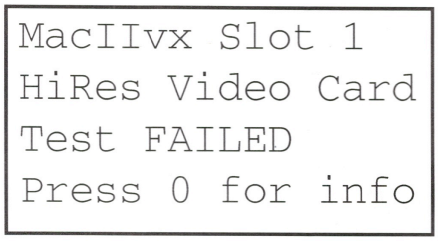


Figure 2-79 NuBus Scan Video Test-Failed Screen

VRAM Failures – Monochrome Video Card

For the Macintosh II Monochrome Video Card (1-Bit), Apple TechSte isplays the screen in Figure 2-80 when you press **0.**

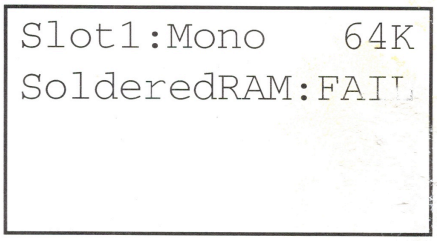


Figure 2-80 NuBus Scan Video Failure Info Screen for Macintosh II Monochrome Video Card, 1-Bit

Whenever soldered RAM fails, the video card must be replaced.

VRAM Failures – Video Cards with Socketed Expansion RAM

For the Macintosh II Video Card, Mac II Portrait Display Video Card, Macintosh II Two-Page Monochrome Video Card, and Macintosh II High-Resolution Display Video Card, Apple TechStep displays a screen similar to that in Figure 2-81 when you press **0** from the screen shown in Figure 2-79. Line four of Figure 2-81 shows the board coordinates for the bad expansion RAM SIMMs. If Apple TechStep detects a card failure but good expansion RAM, lines three and four of Figure 2-81 are blank and line two reads **Soldered RAM: FAIL**.

```
Slot1:HiRes 256K
SolderedRAM:PASS
Bad exp.RAM at:
1C  3C        8C
```

Figure 2-81 Older Video Card Failure Info Screens

If the message **Soldered RAM: FAIL** appears, the card itself must be replaced. If Apple TechStep points out bad expansion RAM, the faulty RAM ICs should be replaced and the card retested. The screen failure codes for socketed expansion RAM ICs are below.

Macintosh II Video Card: 1B, 1C, 1D, 1E, 1G, 1H, 2G, 2H

Macintosh II High-Resolution, Portrait Display, and Two-Page Monochrome Monitor Video Cards: 1C, 2C, 3C, 4C, 5C, 6C, 7C, 8C

These codes are the horizontal-vertical coordinates of the VRAM sockets. The coordinates are silkscreened on the video card.

VRAM Failures – 4•8 and 8•24 Video Cards

The Macintosh II Display Card 4•8 has two slots for VRAM SIMMs. The slots are marked **J3** and **J4**. (**J3** and **J4** are painted markers next to the slots, not coordinates.)

The Macintosh II Display Card 8•24 has soldered RAM; this soldered RAM is in **Bnk1L** and **Bnk1H**. Bank 1H corresponds to SIMM J3 on the 4•8 card; 1L corresponds to SIMM J4.

Because Apple TechStep cannot distinguish between the 4•8 and 8•24 Display Cards, the failure message for both cards is similar to the screen in Figure 2-82.

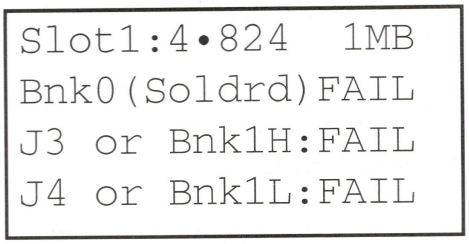


Figure 2-82 4•8 and 8•24 VRAM Failure Screen

For an 8•24 card, a **J3 or Bnk1H** failure or a **J4 or Bnk1L** failure means a failure of soldered RAM—the card is probably faulty. For a 4•8 card, the VRAM SIMM(s) are probably faulty.

If Apple TechStep detects no SIMMs in J3 and J4 on a 4•8 card, or if the SIMMs are so dead they are invisible, you will see **N/F?** on lines three and four of the message. On an 8•24 card, **N/F?** means the soldered RAM in bank 1L and/or 1H failed so badly that Apple TechStep cannot even detect the RAM—in this case, the card needs to be replaced.

VRAM SIMMs – 8•24GC Video Cards

In addition to soldered VRAM and soldered SRAM, the Macintosh II Display Card 8•24GC has two slots for VRAM SIMMs. The slots are marked **J3** and **J4** on the card. (J3 and J4 are painted markers next to the slots—not grid coordinates.)

For the Macintosh II Display Card 8•24GC, a failure screen similar to Figure 2-83 appears. This screen can indicate that VRAM SIMMs need to be replaced, or in the case of soldered VRAM or SRAM, that the card itself needs to be replaced.

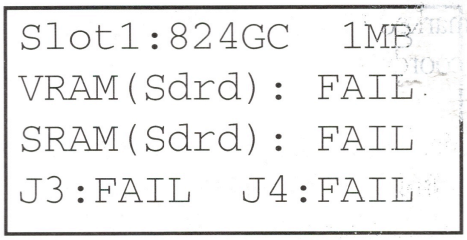


Figure 2-83 8•24GC Failure Screen

In the event of mismatched (different size) SIMMs, the smaller SIMM appears as a failure. The total RAM size shown on line one assumes that both SIMMs are the same size—the size of the larger SIMM. **N/F?** on line four indicates that SIMMs are not found (if installed, they are so faulty as to be undetectable); **PASS** appears for both SIMMs in the test log.

Expansion Slot Menu (IIsi only)

Necessary cable: none

When you choose **Expansion Slot** from the HOME menu, a submenu similar to the one in Figure 2-84 appears.

```
Expansion Slot
1-AdapterCd FPU
2+Expansion Card
```

Figure 2-84 Expansion Slot Menu Screen

If you press **1**, Apple TechStep tests the FPU IC on the adapter card. For more information, see the Adapter Card FPU IC test description.

If you press **2**, Apple TechStep scans the adapter card for an expansion card. For more information on the scan, see the Expansion Card test description.

AdapterCd FPU – Adapter Card FPU IC Test (IIsi only)

Necessary cable: modem

Components under test: FPU on NuBus adapter cards; FPU on 030 adapter cards

Log notes: Extended failure messages appear in the printed log only.

Reporting format:

```
ROM A Run Err 1
AdFPU   1   1
```

This FPU test is similar to the FPU tests in the Logic and HOME menus. Figure 2-85 shows the result screen you see when the FPU is functional enough for Apple TechStep to detect the presence of an FPU IC, but the FPU is nevertheless faulty.

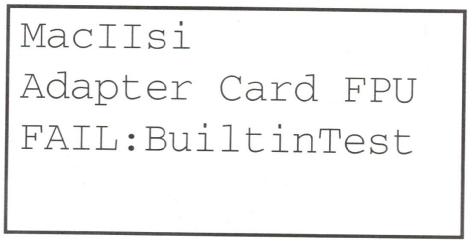


Figure 2-85 Adapter Card FPU Test Results Screen

Figure 2-86 shows the test result screen you see when an FPU is too damaged for Apple TechStep to detect the IC, or when no FPU IC is present. Since all Apple Adapter cards contain an FPU, this may simply mean that no adapter card is installed.

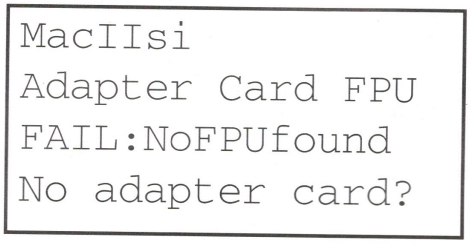


Figure 2-86 Adapter Card FPU Test Results Scre

Expansion Card Scan/Identification Function (IIsi only)

Necessary cable: modem

Prerequisites:

- NuBus card attached to NuBus adapter, or
- 030 Direct Slot (PDS) card attached to 030 adapte

Components under test; Video and nonvideo NuBus exp ans n cards, 030 Direct expansion cards

Log notes: The expansion card scan/identification function does not appear in the screen or print (Report Generator) logs. If the expansion card is a video card, test results for the Video Card test will appear in the log. See Nubus Cards (Video Card Tests) ear n for log formats.

Figure 2-87 shows the screen that appears if you press **2** in Figure 2-84.

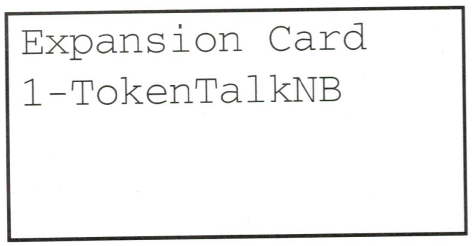


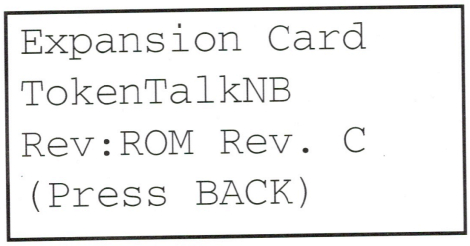
Figure 2-87 Expansion Card Menu Screen

Video NuBus Expansion Cards

If the card in Figure 2-87 is a video card, pressing **1** causes Apple TechStep to run a test equivalent to the Video Card test in the NuBus Cards description. For names and results screens for the video NuBus cards, refer to the NuBus Cards test description and Table 2-14. The expansion slot appears as **Slot 1** on the result screens for the Video Card tests.

Nonvideo NuBus and 030 Direct Expansion Cards

If the expansion card is a nonvideo card, pressing **1** displays an identification screen (see Figure 2-88). The screen provides revision information but does not test the card. If Apple TechStep cannot find a card or revision information, the screen will tell you so. For names and results screens for the nonvideo NuBus cards, refer to the NuBus Cards test description and Table 2-13.



gure 2-88 Nonvideo Expansion Card ID Screen

More RAM Tests Menu

Components under test: Soldered (except Macintosh IIci computers) and SIMM RAM

Log notes: See the log notes for the RAM test earlier in this section.

This menu offers four versions of RAM tests. The essential differences are the testing pattern, the thoroughness of the test, and the time requirements. Table 2-15 shows approximate RAM test time requirements.

Table 2-15 RAM Test Time Requirements

Test	Time
Standard	4.5 sec/MB
Extended	7 sec/MB
Long (Moving Inversion)* (not available for IIci)	22 min/MB
All RAM tests	23 min/MB (IIci: 11.5 sec/MB)

* The Long (Moving Inversion) test time is not linear. RAM configurations larger than 8 MB can take longer than 22 min/MB.

All four RAM tests use the same format for reporting RAM failures. For details, see RAM – RAM Standard Test under the Logic tests menu.

Note For the Macintosh IIci, the Long (Moving Inversion) RAM test is not available. The All RAM test for the Macintosh IIci includes only the Standard and Extended tests, and takes approximately 11.5 seconds per MB.

RAM: Standard – Standard RAM Test

Necessary cable: modem
Components under test: Soldered (except Macintosh IIci computers) and SIMM RAM
Log notes: See the log notes for the RAM Size test description.
Looping: Yes

The Standard RAM test appears in the More RAM Tests menu as well as in the Logic tests menu. For further information, see the Logic tests description.

RAM: Extended – Extended RAM Test

Necessary cable: modem
Components under test: Soldered (except Macintosh IIci computers) and SIMM RAM
Log notes: See the log notes for the RAM Size test description.
Looping: Yes

The Extended RAM test is the extended version of the RAM (Standard) test in the Logic tests menu. The Extended test uses a different and more thorough marching pattern of reads and writes than does the Standard test. The Extended RAM test requires seven seconds per MB.

RAM: Long (Mvg Inv) – Long (Moving-Inversion) RAM Test (except IIci)

Necessary cable: modem
Components under test: Soldered (except Macintosh IIci) and SIMM RAM
Log notes: See the log notes for the RAM Size test description.
Looping: Available, but see warning screens in Figure 2-89.

▲ Caution **The Long RAM test does not stop when it finds a failure or if you press the *stop* key; the test always runs its full length, even if it finds a failure early in the run. When looping, pressing the *stop* key stops the test, but only at the end of a complete test loop—stopping may take hours, depending on the amount of installed RAM.**

The Long (Moving-Inversion) RAM test runs longer and more complex than the RAM (Standard) test that appears in the Logic tests menu. The Long RAM test uses a moving-inversions test pattern that helps detect

intermittent RAM failures. (Because the Macintosh IIci ROM does not contain the necessary code, the Long RAM test is unavailable for the Macintosh IIci.)

The Long RAM test requires 22 minutes per MB. For a 10 MB computer, the test takes almost four hours.

Before Apple TechStep allows you to initiate the Long RAM test, the warnings in Figure 2-89 appear.

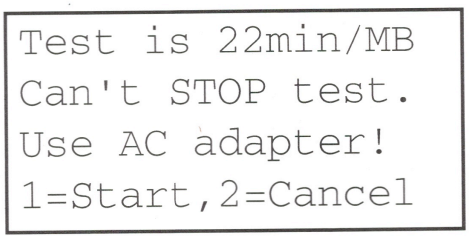
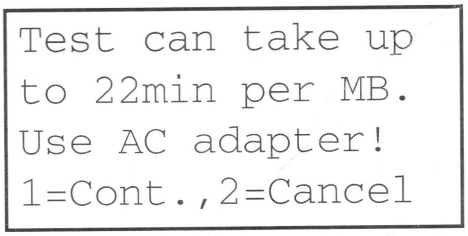


Figure 2-89 Warning Screen for the Long RAM Test and All RAM Tests (except looped tests)

The failure screen for the Long RAM test uses the same format as the Standard RAM test failure screen.

If you choose to loop the Long RAM test, the first of the warning screens shown in Figure 2-90 appears. If you press **1** from this screen, you will see the second warning screen.



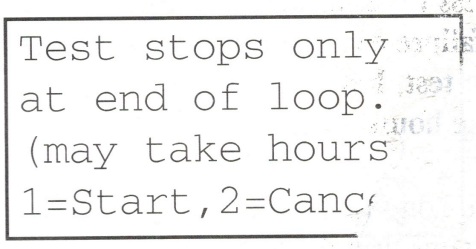


Figure 2-90 Warning

RAM: All Tests – All RAM Tests

Necessary cable: modem
Components under test: Soldered RAM (except Macintosh IIci computers) and SIMM RAM
Looping: Yes. See the warning screens in Figures 2-89 and 2-90 (except for Macintosh IIci computers).

RAM: All Tests runs all the RAM tests listed on the More RAM Tests menu. Apple TechStep will repeat the warnings in Figures 2-89 and 2-90 before it allows you to initiate a loop. Because RAM: All Tests for Macintosh IIci computers does not contain the Long RAM test, you will not see the test length warning screens. RAM: All Tests for the Macintosh IIci includes the Standard and Extended RAM tests only and takes approximately 11.5 seconds per MB.

RAM: All Tests will not stop when it finds a failure or when you press the *stop* key; the test always runs through its full length, even if it finds a failure early in the run. When looping, pressing the stop key stops the test only at the end of a complete loop—stopping may take hours, depending on the amount of RAM installed.

The three RAM tests use different test patterns; therefore, one test may catch an error that escaped another test. To obtain the most thorough Apple TechStep test of RAM, run RAM: All Tests overnight.

You see the warnings in Figures 2-89 and 2-90 before Apple TechStep allows you to initiate the test. The failure screen for All RAM tests uses the same format as the Standard RAM test failure screen.

ADB Status – Apple Desktop Bus Status Test

Necessary cable(s): ADB1
Screen log format:

```
ADBs    1    1
```

▲Caution **Do not connect or disconnect ADB cables while the Macintosh computer or Apple TechStep has power. Always switch power off before you connect or disconnect ADB cables.**

The ADB Status test measures the voltages on pin 2 (POWER.ON—the PowerUpKey line) and pin 3 (+5 V—the power supply line). If the voltages are OK, the test passes and you see the screen in Figure 2-91.

The ADB Status test does not check communication among ADB devices.

```
MacIIsi
ADB Status Test
Test PASSED
CPU is ON.
```

Figure 2-91 ADB Status Test Passed Screen

If Apple TechStep senses less than 2 V on the ADB +5 V line (pin 3), the screen in Figure 2-92 appears. Pressing **2** returns you to the HOME menu.

```
If CPU is OFF,
turn ON.  Else:
1-Continue
2-Cancel
```

Figure 2-92 ADB Status Test Failure Screen

If the computer power switch is off, switch it on. The test will run. If the computer power switch is already on, press **1**.

Table 2-7 shows the ADB Status test failure information that appears on lines three and four of Figure 2-91 when the test fails.

SCSI Term – SCSI Termination Setting [ON or OFF]

Necessary cable: SCSI
Log notes: not logged

This function allows you to use Apple TechStep to supply termination for the SCSI bus if no physical terminator is available (if you are working on a computer with no hard drive, for example).

The Apple TechStep SCSI termination status appears in the HOME menu on the line next to the name **SCSI Term**. Pressing the key that corresponds to the SCSI Term menu item toggles the Apple TechStep termination on and off.

Figure 2-93 shows a screen that indicates SCSI termination status is off.

```
MacIIsi HOME  3↑
1+More RAM Tests
2-ADB Status
3-SCSI Term[OFF]
```

Figure 2-93 SCSI Term Status Screen

Note The Apple TechStep SCSI Termination function requires the Macintosh computer or an external SCSI device to supply termination power.

Note When you switch Apple TechStep on, SCSI Term defaults to off. This default prevents Apple TechStep from masking problems with the Macintosh computer SCSI bus termination.

SCSI Functions Menu

The SCSI functions in this menu also appear in the following ROM packs: *SCSI HD Tests*; *CPU Tests, Volume 1*; and *CPU Tests, Volume 2*.

SCSI Term Powr – SCSI Termination Power

Necessary cable: SCSI

Log notes: The SCSI Term Powr function reads the termination voltage continuously until you push any key except the *star* (*) key. The log shows the last voltage reading before you pushed the key.

Screen log format:

```
TrmPr  5.00 Vdc
```

▲Caution **Connecting or disconnecting the SCSI cable while the Macintosh computer or an external SCSI device has power can blow the fuse or diode. Always switch off all devices before you connect or disconnect a SCSI cable.**

The SCSI Term Powr function measures and displays the termination voltage on the SCSI bus. Apple TechStep indicates whether the termination power is **OFF**, **LO**, **OK**, or **HI**, as follows:

OFF	=	0.00 to 0.99 V
LO	=	1.00 to 4.14 V
OK	=	4.15 to 5.24 V
HI	=	5.25 V or above

Insufficient voltage may be the result of a blown fuse or diode on the logic board.

Figure 2-94 shows a sample measurement.

```
MacIIsi
SCSI Term Power
Actual=5.00V: OK
Normal=>4.15V
```

Figure 2-94 SCSI Termination Power

To measure the SCSI termination voltage:

1. Switch on all devices attached to the Apple TechStep.
2. Select **SCSI Term Powr** from the menu.

SCSI Term Chk – SCSI Termination Check

Necessary cable: SCSI
Screen log format:

```
TrmCk    1     1
```

This test checks the SCSI bus to see whether ter[illegible]orrect. To perform a SCSI termination check:

1. Switch on all devices attached to Apple TechStep—every device on the SCSI bus.
2. Select **SCSI Term Chk** from the menu.

If the Apple TechStep SCSI termination feature is off, the test proceeds immediately.

If the Apple TechStep SCSI termination feature is on, you see the screen in Figure 2-95. If the SCSI termination feature is on when you run the SCSI Termination Check, the Apple TechStep may mask SCSI termination problems in the computer. In most situations, choose **1** to switch off termination. After you press **1** or **2**, the test proceeds.

```
Apl TS SCSI Term
feature is ON:
1-Turn it OFF
2-Leave it ON
```

Figure 2-95 SCSI Termination Check Dialog Screen

Figure 2-96 shows a test result.

```
MacIIsi
SCSI Term Check
Test PASSED
```

Figure 2-96 SCSI Termination Check Result Screen

The test indicates **PASSED** or **FAILED**. If the check fails, verify the SCSI termination. See "SCSI Bus Termination" in Chapter 1 for more information.

Note Miniscribe hard drives sporadically fail the SCSI Termination Check. Do not replace the drive unless the drive exhibits other problems. Peculiarities of the Miniscribe hard drive cause the erroneous test results.

SCSI Bus Scan – SCSI Bus ID Scan

Necessary cable: SCSI
Components under test: SCSI bus, SCSI devices
Log notes: This scan does not appear in screen or print (Report Generator) logs.

Before scanning the bus, Apple TechStep checks for SCSI bus termination. If Apple TechStep fails to find termination, the screen in Figure 2-97 appears.

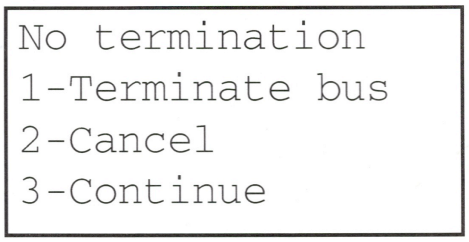


Figure 2-97 SCSI Bus ID Scan Screen

The SCSI Bus Scan examines the SCSI bus; builds a table of SCSI device names, device ID numbers, and ROM versions; and displays a menu of this information. Figure 2-98 shows a sample screen.

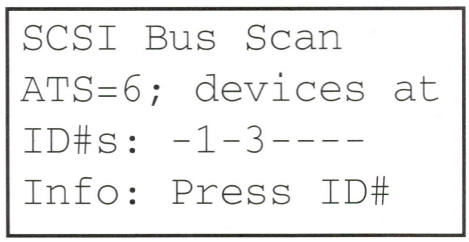


Figure 2-98 SCSI Bus ID Scan Screen

In Figure 2-98, **ATS** indicates the current SCSI ID of Apple TechStep. Line three shows the non-Apple TechStep SCSI IDs that the scan detects. A hyphen (-) replaces a number that corresponds to no device. To display information about a device, press the number of the device.

Figure 2-99 shows a sample information screen.

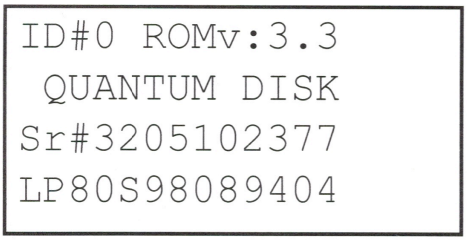


Figure 2-99 SCSI Device Information Screen

If the device is a hard drive, the following line information appears:

Line 1: SCSI ID number and ROM version of device
Line 2: Manufacturer name and product name (from device ROM)
Line 3: Serial number (not available for all drives; first 13 characters only)
Line 4: Product number (first 16 characters only)

If the device is an Apple product, an Apple (🍎) appears in the first position of line two; otherwise the first position is blank.

Targets and Initiators

There are two types of SCSI devices: initiators and targets. Initiators can initiate messages as well as receive and respond; targets can only receive and respond. The Macintosh computer and Apple TechStep are initiators; hard drives, printers, CD ROMs, scanners, and other peripherals are targets.

The SCSI Bus Scan shows only SCSI target devices. Initiators, such as the Macintosh computer and Apple TechStep, do not appear on the SCSI Bus Scan screen. If you choose a SCSI ID number that an initiator occupies or that doesn't correspond to a SCSI device, the dialog screen in Figure 2-100 appears.

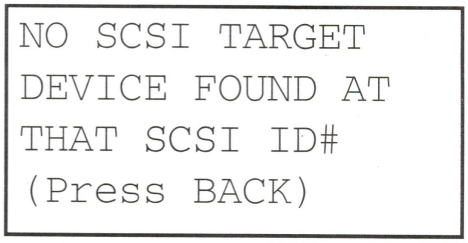


Figure 2-100 No-SCSI-Target-Device-Found Dialog Screen

Test Manager Entry

Before you run a SCSI Bus Scan of a chain that includes a switched-on Macintosh computer, Apple TechStep checks that the Macintosh computer is in Test Manager mode. If the computer is not in Test Manager mode, the computer could send commands on the SCSI bus while tests are running and thus invalidate results.

AplTS SCSI #: – Set Apple TechStep SCSI ID

Necessary cable: none

To talk on the bus without causing data collisions, every device on a SCSI bus must have a unique SCSI device address (ID). Whenever you switch on Apple TechStep, it assigns itself a default SCSI device address of 6. If another device on the SCSI bus already has address 6, use the AplTS SCSI# function to change the Apple TechStep address to any other legal SCSI address (0-7). Note, however, that the factory sets Macintosh computers to SCSI address 7. If you connect Apple TechStep to a Macintosh computer, do not assign address 7 to Apple TechStep.

Figure 2-101 shows a sample screen.

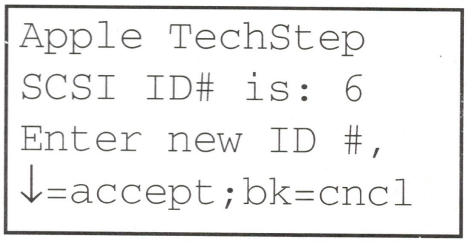


Figure 2-101 Setting the TechStep SCSI ID

Enter the new ID number and press the *down arrow* (↓). This ID will remain the Apple TechStep SCSI ID number until you switch off Apple TechStep. (Changing the active ROM pack does not affect the setting.) Switching off Apple TechStep resets the SCSI ID number to 6.

SCSI Bus Reset

Necessary cable: SCSI
Log notes: Does not appear in screen or print (Report Generator) log.

This function resets all devices on the SCSI bus. Resetting the SCSI bus places the bus in a power-up state. Figure 2-102 shows a sample screen.

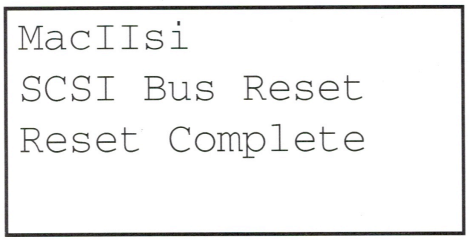


Figure 2-102 SCSI Bus Reset

Power On CPU – Power-On-Computer Function

Cable requirement: ADB1 or ADB2

The Power-On-Computer function allows you to use Apple TechStep to switch on computer power. Figure 2-103 shows a successful result.

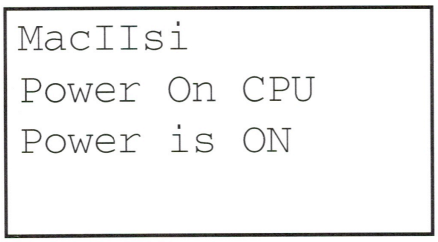


Figure 2-103 Power-On-CPU Successful Result Screen

Figure 2-104 shows an unsuccessful result.

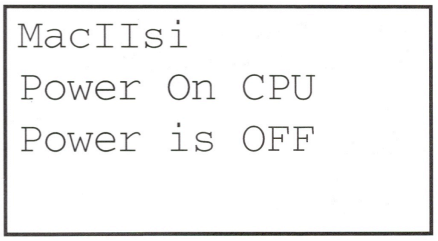


Figure 2-104 Power-On-CPU Unsuccessful Result Screen

Power Off CPU – Power-Off-Computer Function

Cable requirements: ADB1 or ADB2; modem

The Power-Off-Computer function allows you to use Apple TechStep to switch off computer power. To use this function, the computer must be in Test Manager mode. Figure 2-105 shows a successful result screen.

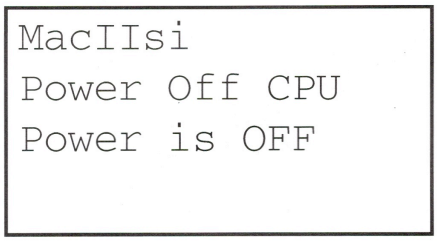


Figure 2-105 Power-Off-CPU Successful Result Screen

If the computer is powered on but not in Test Manager mode, the screen in Figure 2-106 appears. You must switch off the computer manually.

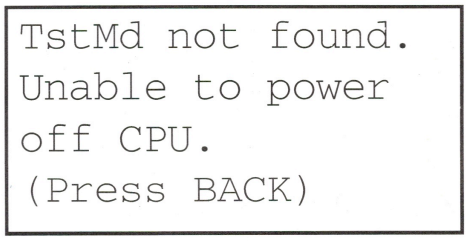


Figure 2-106 Power-Off-CPU Failure Message

Chapter 3
Troubleshooting Strategies

General Tips

Below are general tips for using Apple TechStep to troubleshoot Macintosh computers.

Remove Peripherals and Non-Apple Cards

If you experience problems during testing, remove non-Apple cards, disconnect peripherals, and retest. When the computer passes, reinstall the expansion cards and reconnect peripherals one at a time and retest. Repeat the install-and-test process until you reinstall all cards and peripherals, and the computer passes all tests.

Obtain Clues From Extended Failure Messages

Extended failure messages—such as on line three of the SCSI (Logic) test failure screen or on screens that you access by pressing **0** for information—provide additional information about a failure.

Use the Test Hierarchy

The Apple TechStep menus list the tests in order of priority; tests that require the lowest level of computer functionality appear first. For example, the ROM Checksum is the first individual logic test (after All Logic tests) because the ROMs contain the Test Manager, without which none of the later tests runs. Similarly, the RAM functions appear next because most tests store data or instructions in RAM—if RAM is faulty, tests farther down the hierarchy will not run or may give incorrect results.

If you think you know what the problem is and would like to verify your diagnosis, skip to the individual test for that problem. However, if you run tests out of order, the tests may fail because of a problem with an untested prior function. This type of failure is called a prior-function failure (PFF). If the message **Check prior UUT functions** appears, return to the first screen of the HOME menu and run all tests in order.

If Apple TechStep encounters a prior-function failure during looping, testing stops and a Check prior UUT functions screen displays. In the log, a question mark (?) appears at the extreme right of the listing for the test where the prior-function failure occurred.

Figure 3-1 shows typical screen log entries for prior-function failures. By itself, the **?** screen character indicates a prior-function failure in a pass/fail test. For non-pass/fail tests you will see **PFF?**.

```
ROM A Run Err 1
ROMck 1     -
RAMsz PFF?
SCC   1     1 ?
```

Figure 3-1 Prior-Function Failure Log Entries

There are five types of prior-function failures:

Lost comm w/UUT—indicates that the computer Test Manager has stopped responding to commands from Apple TechStep. Loss of Test Manager communication might result from a defective combo IC (or other IC in the case of the Macintosh IIci) on the computer, from a power failure, or from a loose cable. Check power and cable connections, reboot the computer, and test again.

UUT timed out—indicates that Apple TechStep established communication with the Test Manager and downloaded the test to the Macintosh computer RAM, but the computer failed to otherwise respond. Apple TechStep may or may not have lost communication with the computer. If the computer fails to respond within the time that Apple TechStep allows, Apple TechStep terminates the test and displays **UUT timed out**.

The **UUT timed out** message may be the result of a RAM problem or a serious fault with the Macintosh computer. Run all prior tests.

Invalid result—means the test ran, but the computer delivered a failure code that does not make sense or is invalid. Invalid results may be the result of a problem with the previous function in the test hierarchy. Run the All Logic test in nonlooped mode because testing in nonlooped mode will stop at the first failure. If prior tests pass and the same test fails again with the same message, the function you originally tested is probably faulty.

Failed to init—means the test failed to initialize within the Macintosh computer. **Failed to init** may be the result of a problem with the previous function in the test hierarchy. Because testing in nonlooped mode will stop at the first failure, run the All Logic test in nonlooped mode. If prior tests pass and the same test fails again with the same message, the function you originally tested is probably faulty.

Undefined error—means Apple TechStep cannot identify the error. Intermittent failure of circuits unrelated to the current test can cause undefined errors. Because testing in nonlooped mode will stop at the first failure, run the All Logic test in nonlooped mode. If prior tests pass and the same test fails again with the same message, the function you originally tested is probably faulty.

Test Failures as Clues

Each Apple TechStep test or function looks at a single aspect of the Macintosh computer. However, all aspects are interrelated. Thus, don't consider a failure of any single test in isolation—a single failure is one piece in a larger puzzle.

The best advice in using the Apple TechStep is: Don't jump to conclusions! Run all tests before you make a diagnosis. Take all the clues into account, and look at test results as symptoms, not definitive diagnoses. If an individual test doesn't point directly to a fault, use the information from all the tests as pieces in a puzzle. What a test doesn't report can be as important as what a test does report.

For example, some failures that appear to concern the logic board may actually be caused by a NuBus card. In one reported case involving a Macintosh II computer, the All Logic Board test reported an ADB test failure with a Check prior functions message. But the technician decided to run the rest of the tests on the menu before investigating the Prior Function Failure. When he ran the Video Card test, it showed no cards installed—but, in fact, a video card was installed. The technician therefore suspected that the video card might be causing the ADB test failure. And in fact, when he swapped the video card, the logic board problem disappeared.

Note SIMMs are an exception to the advice about not jumping to conclusions. If a test reports that soldered RAM or RAM SIMMs are bad, swap the logic board that contains the soldered RAM or swap the faulty SIMMs before you run other tests—otherwise, test results may be unreliable.

Examples

Below are several examples of how to use Apple TechStep test results as clues in troubleshooting.

Desktop Can't See a Hard Drive—Suppose the Macintosh computer cannot see an internal hard disk (the hard disk icon does not appear on the desktop). How can Apple TechStep help you?

1. Run the SCSI Term Powr test and the SCSI Term Check. If either or both fail, the SCSI fuse may have blown or SCSI termination may be missing. Refer to "SCSI Bus Termination" in Chapter 1 for more information.

2. Run the SCSI Bus Scan. If the SCSI Bus Scan sees the hard drive and displays information about the drive, then the electronics on the hard drive are probably OK.

3. Run the Random Sk/Rd (seek/read) test (in the HD Check menu of the *SCSI HD Tests* ROM pack). If the test passes, the hard drive mechanism is probably OK. If a **Check prior UUT functions** message appears, you probably have a stiction problem. *Stiction* means that lubricant on the platter sticks the heads to the platter and prevents the motor from turning.

4. Before you replace the hard drive, run All Logic tests. The logic board may be at fault also.

Hard Disk Failure—the HD Check test or the HD Check & Fix test on the *SCSI HD Tests* ROM pack fails to complete and returns a **Check prior UUT functions** message. If the SCSI Bus Scan in *CPU Tests, Volume 3* sees the drive and obtains information, the drive is electronically OK but the hard disk isn't spinning. In other words, the drive probably has a stiction problem.

Strategy Help

Refer to other sections of this manual to help you develop your own troubleshooting strategies.

- The table of contents shows the test hierarchy.

- Chapter 2, Test and Function Descriptions, explains interactions between tests.

- Chapter 4, Symptom/Action Tables, gives you a framework for developing your own strategies.

Chapter 4
Symptom/Action Tables

Introduction

The symptom/action tables help you use Apple TechStep to troubleshoot the Macintosh IIci, IIsi, IIvi, IIvx, and Performa 600 computers. Before using the tables, read Chapter 3, Troubleshooting Strategies.

Important **Only Apple Authorized service providers may replace parts. If you are not an Apple Authorized service provider, do not attempt the replacement steps in this section. Take your system to an Apple Authorized service provider for service. If you do attempt to service your own system without being authorized, you assume all liability and risk of personal and/or equipment damage.**

Find the symptom that most nearly describes the problem; perform the first corrective action on the list. If the first corrective action does not fix the problem, go to the next action. If you swap a module and find that the problem remains, reinstall the original module before you perform the next action.

Note When the instructions ask you to swap the logic board, move the customer's DRAM and VRAM SIMMs to the new board. Take-apart and adjustment procedures are on the *Apple Service Source* CD-ROM. Some adjustment procedures are also in the *Apple Service Guide for Macintosh Computers, Volume I and II*.

Macintosh IIci Computers

Startup and Power Problems	Solutions
Computer doesn't power on; screen is black, fan doesn't run, and LED doesn't light	1. Check internal and external power cable connections. 2. Plug monitor directly into AC outlet. Verify monitor has power. 3. Swap power cable. 4. Use Apple TechStep PwUpV to measure trickle current from the power supply. If voltage is below 4.0 V, swap power supply. 5. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply. 6. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
Computer shuts down intermittently	1. Make sure air vents on computer case are unobstructed. Thermal protection circuitry may shut down computer. After 30 to 40 minutes, computer should run. 2. Use Apple TechStep PowrS to measure power supply voltage. If voltage wavers, disconnect peripherals and cards. 3. Swap power cable. 4. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply. 5. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
Computer intermittently crashes or locks up	1. Verify you have the correct version of system software. 2. Verify you are using known-good application software. 3. Check software extensions. 4. Swap system software. 5. Check cache card serial number. If the serial number begins with *CF*, return card to Apple. See the Service Programs chapter of the Service Programs manual on *Service Source*. 6. Run Apple TechStep All Logic tests. If RAM (Standard) test fails, swap faulty SIMMs. If any other test fails, swap logic board and move customer's SIMMs to new board. 7. Run Apple TechStep RAM (Extended) Test. Swap faulty SIMMs. If no trouble is found, loop on the test for two hours. 8. Run Apple TechStep Cache Card test. If test fails, swap cache card. 9. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply.

Computer intermittently doesn't power on	1. Check internal and external cable connections. 2. Swap power cable. 3. Power on computer using Apple TechStep. If computer powers on consistently, check keyboard and ADB cable(s). 4. Use Apple TechStep PwUpV to measure trickle current from the power supply. If voltage is below 4.0 V, swap power supply. 5. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply. 6. Run Apple TechStep All Logic tests. If RAM (Standard) test fails, swap faulty SIMMs. If another test fails, swap logic board and move customer's SIMMs to new board.
Computer seems to boot, but message "Finder is old version" appears	1. Use Apple TechStep destructive P/RAM test to clear parameter RAM. 2. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
No sound coming from speaker	1. Verify volume setting in Control Panel is 1 or above. 2. Verify speaker cable connections are tight. 3. Swap speaker. 4. Run Apple TechStep All Logic tests. If Sound or VIA test fails, swap logic board. Move customer's SIMMs to new board.
Computer makes clicking, chirping, or thumping sounds	1. Use Apple TechStep PowrS to measure power supply voltage. If voltage wavers, disconnect peripherals and cards. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply. 2. Disconnect hard drive power cable. If noise disappears, swap cable and then drive. 3. Disconnect floppy drive(s). If noise disappears swap drive(s). 4. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
Clock doesn't run	1. Use voltmeter to measure battery voltage. If voltage is below 2.8 V, replace battery. 2. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
MacTest Pro crashes	1. Remove Macintosh IIci cache card and rerun MacTest Pro. 2. Use Apple TechStep destructive P/RAM test to clear parameter RAM.

Mouse and Keyboard (ADB) Problems	Solutions
Double-click doesn't open application, disk, or server	1. Remove duplicate System files from hard drive. 2. Use Apple TechStep destructive P/RAM test to clear parameter RAM. Reset mouse controls. 3. If mouse was connected to keyboard, connect mouse to ADB port on computer. If mouse works, swap keyboard. 4. If mouse does not work in any ADB port, swap mouse. 5. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
Cursor doesn't move	1. Reboot computer. 2. Check mouse connection. 3. Clean mouse. 4. If mouse was connected to keyboard, connect mouse to ADB port on computer. If mouse works, swap keyboard. 5. If mouse does not work in any ADB port, swap mouse. 6. Use Apple TechStep PwUpV to measure power up voltage. If the voltage is below 4.8 V, swap the ADB cable. If the power up voltage is still below 4.8 V, swap the logic board. 7. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply. 8. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
Cursor moves, but clicking mouse has no effect	1. Swap mouse. 2. Run Apple TechStep All Logic tests. If ADB test fails, swap logic board. Move customer's SIMMs to new board.
Computer doesn't respond to keyboard	1. Check keyboard connection to ADB port. 2. Swap keyboard cable. 3. Swap keyboard. 4. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.

Video Problems	Solutions
Screen is black, fan doesn't run, and LED isn't lit	1. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply. 2. See Flowchart 4-1. 3. Plug monitor directly into wall socket to verify it has power. 4. Remove NuBus cards (if installed). 5. Remove peripheral devices (if installed). 6. Run Apple TechStep All Logic tests. If RAM test (Standard) fails, swap failed SIMM(s).If any other test fails, swap logic board. Move customer's SIMMs to new board.

Screen is black, no audio, but fan is running and LED is lit	1. **If testing on-board video**, use Apple TechStep Video Patterns test to verify RAM is in bank A. If RAM is in bank B, move RAM to bank A. **If testing a video card**, Use Apple TechStep NuBus Cards test. If a test fails, replace indicated VRAM or video card. 2. Swap video cable. 3. Swap monitor. Refer to *Service Source* for monitor service information. 4. Use Apple TechStep to test on-board video port. Generate video test patterns. If a test fails, swap logic board. Move customer's SIMMs to new board. 5. Swap peripheral devices (if installed). 6. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply.
Screen is black, audio and drive operate, fan runs, and LED is lit	1. Adjust brightness on monitor. 2. **If testing on-board video**, use Apple TechStep Video Patterns test to verify RAM is in bank A. If RAM is in bank B, move RAM to bank A. **If testing a video card**, Use Apple TechStep NuBus Cards test. If a test fails, replace indicated VRAM or video card. 3. See Flowchart 4-1. 4. Swap video cable. 5. Swap monitor. Refer to *Service Source* for monitor service information. 6. Use Apple TechStep to test on-board video port. Generate video test patterns. If a test fails, swap logic board. Move customer's SIMMs to new board. 7. Swap peripheral devices (if installed). 8. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply.
Partial or whole screen is bright and audio is present, but there's no video information	1. See Flowchart 4-1. 2. Swap video cable. 3. Swap monitor. Refer to *Service Source* for monitor service information. 4. Use Apple TechStep to test video card (if installed). Run NuBus Cards test. If a test fails, replace video card. 5. Use Apple TechStep to test on-board video port. Generate video test patterns. If a test fails, swap the logic board. Move customer's SIMMs to new board. 6. Verify ROM jumper is on logic board. 7. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.

Monitor displays black-and-white video only*	1. Change monitor CDEV in Control Panel for additional shades of gray. 2. Use Apple TechStep to test video card (if installed). Run NuBus Cards test. If test fails, replace video card. 3. Use Apple TechStep to test on-board video port. Generate video test patterns. If a test fails, swap logic board. Move customer's SIMMs to new board.

SCSI Problems	**Action**
Internal drive runs continuously	1. See Flowchart 4-2. 2. Swap drive power cable. 3. Swap internal SCSI cable. 4. Swap drive. 5. Run Apple TechStep All Logic tests. If a test fails, swap logic board and move customer's SIMMs to new board.
Internal drive doesn't operate, but fan runs	1. See Flowchart 4-3. 2. Swap internal SCSI cable. 3. Swap drive power cable. 4. Swap drive. 5. Run Apple TechStep All Logic tests. If a test fails, swap logic board and move customer's SIMMs to new board.
Internal or external SCSI device works, but not both	1. Verify all SCSI devices have unique SCSI IDs. 2. See Flowchart 4-3.

Floppy Drive Problems	**Action**
Computer desktop can't see drive and neither can Apple TechStep; logic board passes all tests	1. Verify internal floppy drive cable connections are secure. 2. Attach external floppy drive. If external drive doesn't appear on desktop, swap logic board. If external drive appears on desktop, swap drive. If you can't attach external drive, swap logic board and then drive.
Audio and video are present, but internal drive doesn't operate	1. Insert a known-good disk into drive. 2. Verify internal floppy drive cable connections are secure. 3. Verify all external SCSI devices are disconnected. 4. Run Apple TechStep Drive test. If test fails, swap drive cable. 5. Clean drive. If the drive is a SuperDrive, install a dust shield. 6. Swap drive. 7. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.

* Computers with 1 MB of memory default to black-and-white video. You can allocate additional memory to video on 1 MB computers, but this leaves little RAM free for other applications.

Drive is unable to read; many file transfer errors occur	1. Insert a known-good disk into drive. 2. Verify internal floppy drive cable connections are secure. 3. Clean drive. If the drive is a SuperDrive, install a dust shield. 4. Run Apple TechStep Drive test. If test fails, swap drive.
Drive will read but not write	1. Check internal floppy drive cable connections. If they are secure, replace internal floppy drive cable. 2. Clean drive. If the drive is a SuperDrive, install a dust shield. 3. Run Apple TechStep Drive test. If test fails, swap drive.
Disk initialization fails	1. Verify you are using the proper type of media. 2. Insert a known-good disk into drive. 3. If the disk is 800K, upgrade system software versions earlier than 6.0.5. The 800K INIT is not in earlier versions. 4. Clean drive. If the drive is a SuperDrive, install a dust shield. 5. Check internal floppy drive cable connections. If they are secure, replace internal floppy drive cable. 6. Run Apple TechStep Drive test. If test fails, swap drive.
Drive doesn't eject disk	1. Switch computer off. Hold mouse button down while you switch computer on. 2. Eject disk manually by pushing opened paper clip into hole beside drive slot. 3. Run Apple TechStep Drive test. If test fails, swap drive cable. 4. Swap drive.
Disk ejects; display shows icon with blinking "X"	1. Swap floppy disk with known-good system disk. 2. Run Apple TechStep Drive test. If test fails, swap drive cable. 3. Swap drive. 4. Run Apple TechStep All Logic tests. If RAM (Standard) test fails, swap faulty SIMMs. If a test fails, swap logic board and move customer's SIMMs to new board.
Drive attempts to eject disk but can't	1. Push disk in completely. 2. To eject disk manually, push opened paper clip into hole beside drive slot. 3. Run Apple TechStep Drive test. If test fails, swap drive.

Printer Problems	Action
Known-good ImageWriter or ImageWriter II won't print	1. Make sure Chooser and Control Panel indicate ImageWriter icon and correct ImageWriter printer. 2. Verify printer—print through either serial port (modem or printer) or another computer. 3. Connect printer directly to computer. 4. Make sure system software is version 6.0.8 or later. 5. Swap printer driver and system software with known-good driver and known-good system software. 6. Run Apple TechStep All Logic tests. If SCC test fails, swap logic board and move customer's SIMMs to new board. If SCC test passes, swap computer-to-printer cable. 7. Use Apple TechStep destructive P/RAM test to clear parameter RAM. 8. For network troubleshooting information, refer to Networking & Communication manual in *Service Source*.
Known-good LaserWriter won't print	1. Make sure Chooser and Control Panel indicate LaserWriter icon and correct LaserWriter printer. 2. Connect printer directly to computer. 3. Swap printer driver and system software with known-good driver and known-good system software. 4. Run Apple TechStep All Logic tests. If SCC test fails, swap logic board and move customer's SIMMs to new board. If SCC test passes, swap computer-to-printer cable. 5. Use Apple TechStep destructive P/RAM test to clear parameter RAM. 6. For network troubleshooting information, refer to Networking & Communication manual in *Service Source*.

Macintosh IIsi Computers

Startup and Power Problems	Solutions
Computer doesn't power on; screen is black, fan doesn't run, and LED doesn't light	1. Check internal and external power cable connections. 2. Plug monitor directly into AC outlet. Verify monitor has power. 3. Swap power cable. 4. Use Apple TechStep PwUpV to measure trickle current from the power supply. If voltage is below 4.0 V, swap power supply. 5. Disconnect power cord from computer. Wait 10 seconds, then use Apple TechStep PwUpV to measure the power-up voltage (from battery). If the voltage is below 2.8 V, swap battery. 6. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply. 7. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
Computer shuts down intermittently	1. Make sure air vents on computer case are unobstructed. Thermal protection circuitry may shut down computer. After 30 to 40 minutes, computer should run. 2. Use Apple TechStep PowrS to measure power supply voltage. If voltage wavers, disconnect peripherals and cards. 3. Swap power cable. 4. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply. 5. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
Computer intermittently crashes or locks up	1. Verify you have the correct version of system software. 2. Verify you are using known-good application software. 3. Check software extensions. 4. Swap system software. 5. Run Apple TechStep All Logic tests. If RAM (Standard) test fails, swap faulty SIMMs. If any other test fails, swap logic board and move customer's SIMMs to new board. 6. Run Apple TechStep RAM (Extended) Test. Swap faulty SIMMs. If no trouble is found, loop on the test for two hours. 7. Run Apple TechStep RAM (Long) Test. Swap faulty SIMMs. The Long test can take 22 minutes per megabyte. 8. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply.

Computer intermittently doesn't power on	1. Check internal and external power cable connections. 2. Swap power cable. 3. Power on computer using Apple TechStep. If computer powers on consistently, check keyboard and ADB cable(s). 4. Use Apple TechStep PwUpV to measure trickle current from the power supply. If voltage is below 4.0 V, swap power supply. 5. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply. 6. Run Apple TechStep All Logic tests. If RAM (Standard) test fails, swap faulty SIMMs. If another test fails, swap logic board and move customer's SIMMs to new board.
Computer seems to boot, but message "Finder is old version" appears	1. Use Apple TechStep destructive P/RAM test to clear parameter RAM. 2. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
No sound coming from speaker	1. Verify volume setting in Control Panel is 1 or above. 2. Verify speaker cable connections are tight. 3. Swap speaker. 4. Run Apple TechStep All Logic tests. If Sound or VIA test fails, swap logic board. Move customer's SIMMs to new board.
Computer makes clicking, chirping, or thumping sounds	1. Use Apple TechStep PowrS to measure power supply voltage. If voltage wavers, disconnect peripherals and cards. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply. 2. Disconnect hard drive power cable. If noise disappears, swap cable and then drive. 3. Disconnect floppy drive(s). If noise disappears swap drive(s). 4. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
Clock doesn't run	1. Disconnect power cord from computer. Wait 10 seconds, then use Apple TechStep PwUpV to measure the power-up voltage (from battery). If the voltage is below 2.8 V, swap battery. 2. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
MacTest Pro crashes	– Use Apple TechStep destructive P/RAM test to clear parameter RAM.

Mouse and Keyboard (ADB) Problems	Solutions
Double-click doesn't open application, disk, or server	1. Remove duplicate System files from hard drive. 2. Use Apple TechStep destructive P/RAM test to clear parameter RAM. Reset mouse controls. 3. If mouse was connected to keyboard, connect mouse to ADB port on computer. If mouse works, swap keyboard. 4. If mouse does not work in any ADB port, swap mouse. 5. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
Cursor doesn't move	1. Reboot computer. 2. Check mouse connection. 3. Clean mouse. 4. If mouse was connected to keyboard, connect mouse to ADB port on computer. If mouse works, swap keyboard. 5. If mouse does not work in any ADB port, swap mouse. 6. Use Apple TechStep PwUpV to measure power up voltage. If the voltage is below 4.8 V, swap the ADB cable. If the power up voltage is still below 4.8 V, swap the logic board. 7. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply. 8. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
Cursor moves, but clicking mouse has no effect	1. Swap mouse. 2. Run Apple TechStep All Logic tests. If ADB test fails, swap logic board. Move customer's SIMMs to new board.
Computer doesn't respond to keyboard	1. Check keyboard connection to ADB port. 2. Swap keyboard cable. 3. Swap keyboard. 4. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.

Video Problems	Solutions
Screen is black, fan doesn't run, and LED isn't lit	1. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply. 2. See Flowchart 4-1. 3. Plug monitor directly into wall socket to verify it has power. 4. Remove NuBus or adapter card (if installed). 5. Remove peripheral devices (if installed). 6. Run Apple TechStep All Logic tests. If RAM test (Standard) fails, swap failed SIMM(s). If any other test fails, swap logic board. Move customer's SIMMs to new board.

Screen is black, no audio, but fan is running and LED is lit	1. **If testing on-board video**, use Apple TechStep Video Patterns If a test fails, replace the logic board. **If testing a video card**, Use Apple TechStep NuBus Cards test. If a test fails, replace indicated VRAM or video card. 2. Swap video cable. 3. Swap monitor. Refer to *Service Source* for monitor service information. 4. Use Apple TechStep to test video card (if installed). Run NuBus Cards test. If a test fails, replace video card. 5. Use Apple TechStep to test on-board video port. Generate video test patterns. If a test fails, swap logic board. Move customer's SIMMs to new board. 6. Swap peripheral devices (if installed). 7. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply.
Screen is black, audio and drive operate, fan runs, and LED is lit	1. Adjust brightness on monitor. 2. **If testing on-board video**, use Apple TechStep Video Patterns If a test fails, replace the logic board. **If testing a video card**, Use Apple TechStep NuBus Cards test. If a test fails, replace indicated VRAM or video card. 3. See Flowchart 4-1. 4. Swap video cable. 5. Swap monitor. Refer to *Service Source* for monitor service information. 6. Use Apple TechStep to test video card (if installed). Run NuBus Cards test. If a test fails, replace video card. 7. Use Apple TechStep to test on-board video port. Generate video test patterns. If a test fails, swap logic board. Move customer's SIMMs to new board. 8. Swap peripheral devices (if installed). 9. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply.
Partial or whole screen is bright and audio is present, but there's no video information	1. See Flowchart 4-1. 2. Swap video cable. 3. Swap monitor. Refer to *Service Source* for monitor service information. 4. Use Apple TechStep to test video card (if installed). Run NuBus Cards test. If a test fails, replace video card. 5. Use Apple TechStep to test on-board video port. Generate video test patterns. If a test fails, swap the logic board. Move customer's SIMMs to new board. 6. Verify ROM jumper is NOT on logic board. 7. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.

Monitor displays black-and-white video only*	1. Change monitor CDEV in Control Panel for additional shades of gray. 2. Use Apple TechStep to test video card (if installed). Run NuBus Cards test. If a test fails, replace video card. 3. Use Apple TechStep to test on-board video port. Generate video test patterns. If a test fails, swap logic board. Move customer's SIMMs to new board.

SCSI Problems	**Action**
Internal drive runs continuously	1. See Flowchart 4-2. 2. Swap drive power cable. 3. Swap internal SCSI cable. 4. Swap drive. 5. Run Apple TechStep All Logic tests. If a test fails, swap logic board and move customer's SIMMs to new board.
Internal drive doesn't operate, but fan runs	1. See Flowchart 4-3. 2. Swap internal SCSI cable. 3. Swap drive power cable. 4. Swap drive. 5. Run Apple TechStep All Logic tests. If a test fails, swap logic board and move customer's SIMMs to new board.
Internal or external SCSI device works, but not both	1. Verify all SCSI devices have unique SCSI IDs. 2. See Flowchart 4-3.

Floppy Drive Problems	**Action**
Computer desktop can't see drive and neither can Apple TechStep; logic board passes tests	1. Verify internal floppy drive cable connections are secure. 2. Attach external floppy drive. If external drive doesn't appear on desktop, swap logic board. If external drive appears on desktop, swap drive. If you can't attach external drive, swap logic board and then drive.
Audio and video are present, but internal drive doesn't operate	1. Insert a known-good disk into drive. 2. Verify internal floppy drive cable connections are secure. 3. Verify all external SCSI devices are disconnected. 4. Run Apple TechStep Drive test. If test fails, swap drive cable. 5. Clean drive and install a dust shield. 6. Swap drive. 7. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.

* Computers with 1 MB of memory default to black-and-white video. You can allocate additional memory to video on 1 MB computers, but this leaves little RAM free for other applications.

Drive is unable to read; many file transfer errors occur	1. Insert a known-good disk into drive. 2. Verify internal floppy drive cable connections are secure. 3. Clean drive and install a dust shield. 4. Run Apple TechStep Drive test. If test fails, swap drive.
Drive will read but not write	1. Check internal floppy drive cable connections. If they are secure, replace internal floppy drive cable. 2. Clean drive and install a dust shield. 3. Run Apple TechStep Drive test. If test fails, swap drive.
Disk initialization fails	1. Verify you are using the proper type of media. 2. Insert a known-good disk into drive. 3. Clean drive and install a dust shield. 4. Check internal floppy drive cable connections. If they are secure, replace internal floppy drive cable. 5. Run Apple TechStep Drive test. If test fails, swap drive.
Drive doesn't eject disk	1. Switch computer off. Hold mouse button down while you switch computer on. 2. Eject disk manually by pushing opened paper clip into hole beside drive slot. 3. Run Apple TechStep Drive test. If test fails, swap drive cable. 4. Swap drive.
Disk ejects; display shows icon with blinking "X"	1. Swap floppy disk with known-good system disk. 2. Run Apple TechStep Drive test. If test fails, swap drive cable. 3. Swap drive. 4. Run Apple TechStep All Logic tests. If RAM (Standard) test fails, swap faulty SIMMs. If a test fails, swap logic board and move customer's SIMMs to new board.
Drive attempts to eject disk but can't	1. Push disk in completely. 2. To eject disk manually, push opened paper clip into hole beside drive slot. 3. Run Apple TechStep Drive test. If test fails, swap drive.

Printer Problems	Action
Known-good ImageWriter or ImageWriter II won't print	1. Make sure Chooser and Control Panel indicate ImageWriter icon and correct ImageWriter printer. 2. Verify printer—print through either serial port (modem or printer) or another computer. 3. Connect printer directly to computer. 4. Make sure system software is version 6.0.8 or later. 5. Swap printer driver and system software with known-good driver and known-good system software. 6. Run Apple TechStep All Logic tests. If SCC test fails, swap logic board and move customer's SIMMs to new board. If SCC test passes, swap computer-to-printer cable. 7. Use Apple TechStep destructive P/RAM test to clear parameter RAM. 8. For network troubleshooting information, refer to Networking & Communication manual in *Service Source*.
Known-good LaserWriter won't print	1. Make sure Chooser and Control Panel indicate LaserWriter icon and correct LaserWriter printer. 2. Connect printer directly to computer. 3. Swap printer driver and system software with known-good driver and known-good system software. 4. Run Apple TechStep All Logic tests. If SCC test fails, swap logic board and move customer's SIMMs to new board. If SCC test passes, swap computer-to-printer cable. 5. Use Apple TechStep destructive P/RAM test to clear parameter RAM. 6. For network troubleshooting information, refer to Networking & Communication manual in Service Source.

Macintosh IIvi, IIvx, and Performa 600 Computers

Startup and Power Problems	Solutions
Computer doesn't power on; screen is black, fan doesn't run, and LED doesn't light	1. Check internal and external power cable connections. 2. Plug monitor directly into AC outlet. Verify monitor has power. 3. Swap power cable. 4. Use Apple TechStep PwUpV to measure trickle current from the power supply. If voltage is below 4.0 V, swap power supply. 5. Disconnect power cord from computer. Wait 10 seconds, then use Apple TechStep PwUpV to measure the power-up voltage (from battery). If the voltage is below 2.8 V, swap battery. 6. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply. 7. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
Computer shuts down intermittently	1. Make sure air vents on computer case are unobstructed. Thermal protection circuitry may shut down computer. After 30 to 40 minutes, computer should run. 2. Use Apple TechStep PowrS to measure power supply voltage. If voltage wavers, disconnect peripherals and cards. 3. Swap power cable. 4. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply. 5. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
Computer intermittently crashes or locks up	1. Verify you have the correct version of system software. 2. Verify you are using known-good application software. 3. Check software extensions. 4. Swap system software. 5. Run Apple TechStep All Logic tests. If RAM (Standard) test fails, swap faulty SIMMs. If any other test fails, swap logic board and move customer's SIMMs to new board. 6. Run Apple TechStep RAM (Extended) Test. Swap faulty SIMMs. If no trouble is found, loop on the test for two hours. 7. Run Apple TechStep RAM (Long) Test. Swap faulty SIMMs. The Long test can take 22 minutes per megabyte. 8. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply.

Computer intermittently doesn't power on	1. Check internal and external power cable connections. 2. Swap power cable. 3. Power on computer using Apple TechStep. If computer powers on consistently, check keyboard and ADB cable(s). 4. Use Apple TechStep PwUpV to measure trickle current from the power supply. If voltage is below 4.0 V, swap power supply. 5. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply. 6. Run Apple TechStep All Logic tests. If RAM (Standard) test fails, swap faulty SIMMs. If another test fails, swap logic board and move customer's SIMMs to new board.
Computer seems to boot, but message "Finder is old version" appears	1. Use Apple TechStep destructive P/RAM test to clear parameter RAM. 2. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
No sound coming from speaker	1. Verify volume setting in Control Panel is 1 or above. 2. Verify speaker cable connections are tight. 3. Swap speaker. 4. Run Apple TechStep All Logic tests. If Sound or VIA test fails, swap logic board. Move customer's SIMMs to new board.
Computer makes clicking, chirping, or thumping sounds	1. Use Apple TechStep PowrS to measure power supply voltage. If voltage wavers, disconnect peripherals and cards. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply. 2. Disconnect hard drive power cable. If noise disappears, swap cable and then drive. 3. Disconnect floppy drive(s). If noise disappears swap drive(s). 4. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
Clock doesn't run	1. Disconnect power cord from computer. Wait 10 seconds, then use Apple TechStep PwUpV to measure the power-up voltage (from battery). If the voltage is below 2.8 V, swap battery. 2. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
MacTest Pro crashes	– Use Apple TechStep destructive P/RAM test to clear parameter RAM.

Mouse and Keyboard (ADB) Problems	Solutions
Double-click doesn't open application, disk, or server	1. Remove duplicate System files from hard drive. 2. Use Apple TechStep destructive P/RAM test to clear parameter RAM. Reset mouse controls. 3. If mouse was connected to keyboard, connect mouse to ADB port on computer. If mouse works, swap keyboard. 4. If mouse does not work in any ADB port, swap mouse. 5. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
Cursor doesn't move	1. Reboot computer. 2. Check mouse connection. 3. Clean mouse. 4. If mouse was connected to keyboard, connect mouse to ADB port on computer. If mouse works, swap keyboard. 5. If mouse does not work in any ADB port, swap mouse. 6. Use Apple TechStep PwUpV to measure power-up voltage. If the voltage is below 4.8 V, swap the ADB cable. If the power up voltage is still below 4.8 V, swap the logic board. 7. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply. 8. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
Cursor moves, but clicking mouse has no effect	1. Swap mouse. 2. Run Apple TechStep All Logic tests. If ADB test fails, swap logic board. Move customer's SIMMs to new board.
Computer doesn't respond to keyboard	1. Check keyboard connection to ADB port. 2. Swap keyboard cable. 3. Swap keyboard. 4. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.

Video Problems	Solutions
Screen is black, fan doesn't run, and LED isn't lit	1. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply. 2. See Flowchart 4-1. 3. Plug monitor directly into wall socket to verify it has power. 4. Remove NuBus card (if installed). 5. Remove peripheral devices (if installed). 6. Run Apple TechStep All Logic tests. If RAM test (Standard) fails, swap failed SIMM(s). If any other test fails, swap logic board. Move customer's SIMMs to new board.

Screen is black, no audio, but fan is running and LED is lit	1. **If testing on-board video**, use Apple TechStep Video Patterns If a test fails, replace the logic board. **If testing a video card**, Use Apple TechStep NuBus Cards test. If a test fails, replace indicated VRAM or video card. 2. Swap video cable. 3. Swap monitor. Refer to *Service Source* for monitor service information. 4. Use Apple TechStep to test video card (if installed). Run NuBus Cards test. If a test fails, replace video card. 5. Use Apple TechStep to test on-board video port. Generate video test patterns. If a test fails, swap logic board. Move customer's SIMMs to new board. 6. Swap peripheral devices (if installed). 7. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply.
Screen is black, audio and drive operate, fan runs, and LED is lit	1. Adjust brightness on monitor. 2. **If testing on-board video**, use Apple TechStep Video Patterns If a test fails, replace the logic board. **If testing a video card**, Use Apple TechStep NuBus Cards test. If a test fails, replace indicated VRAM or video card. 3. See Flowchart 4-1. 4. Swap video cable. 5. Swap monitor. Refer to *Service Source* for monitor service information. 6. Use Apple TechStep to test video card (if installed). Run NuBus Cards test. If a test fails, replace video card. 7. Use Apple TechStep to test on-board video port. Generate video test patterns. If a test fails, swap logic board. Move customer's SIMMs to new board. 8. Swap peripheral devices (if installed). 9. Use Apple TechStep PowrS to measure power supply voltage. If voltage is below 4.8 V, wait 1 minute and retest. If the voltage is still below 4.8 V, swap power supply.
Partial or whole screen is bright and audio is present, but there's no video information	1. See Flowchart 4-1. 2. Swap video cable. 3. Swap monitor. Refer to *Service Source* for monitor service information. 4. Use Apple TechStep to test video card (if installed). Run NuBus Cards test. If a test fails, replace video card. 5. Use Apple TechStep to test on-board video port. Generate video test patterns. If a test fails, swap the logic board. Move customer's SIMMs to new board. 6. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.

Monitor displays black-and-white video only*	1. Change monitor CDEV in Control Panel for additional shades of gray. 2. Use Apple TechStep to test video card (if installed). Run NuBus Cards test. If a test fails, replace video card. 3. Use Apple TechStep to test on-board video port. Generate video test patterns. If a test fails, swap logic board. Move customer's SIMMs to new board.

SCSI Problems	**Action**
Internal drive runs continuously	1. See Flowchart 4-2. 2. Swap drive power cable. 3. Swap internal SCSI cable. 4. Swap drive. 5. Run Apple TechStep All Logic tests. If a test fails, swap logic board and move customer's SIMMs to new board.
Internal drive doesn't operate, but fan runs	1. See Flowchart 4-3. 2. Swap internal SCSI cable. 3. Swap drive power cable. 4. Swap drive. 5. Run Apple TechStep All Logic tests. If a test fails, swap logic board and move customer's SIMMs to new board.
Internal or external SCSI device works, but not both	1. Verify all SCSI devices have unique SCSI IDs. 2. See Flowchart 4-3.

CD ROM Drive Problems	**Action**
Computer doesn't display CD-ROM drive icon	1. Verify CD-ROM extension is in System Folder. 2. Check SCSI cable connections. 3. Verify CD-ROM has a unique SCSI ID. 4. Run Apple TechStep SCSI tests to verify proper termination power, SCSI termination, and ROM version. One of the tests verifies unique SCSI address. 5. Swap SCSI cable. 6. Swap CD-ROM drive mechanism. 7. Run Apple TechStep All Logic tests. If any test fails, swap logic board and move customer's SIMMs to new board.
CD-ROM drive has intermittent read/play problems	1. Verify disc is good. 2. Clean drive mechanism. 3. Swap CD-ROM drive mechanism.

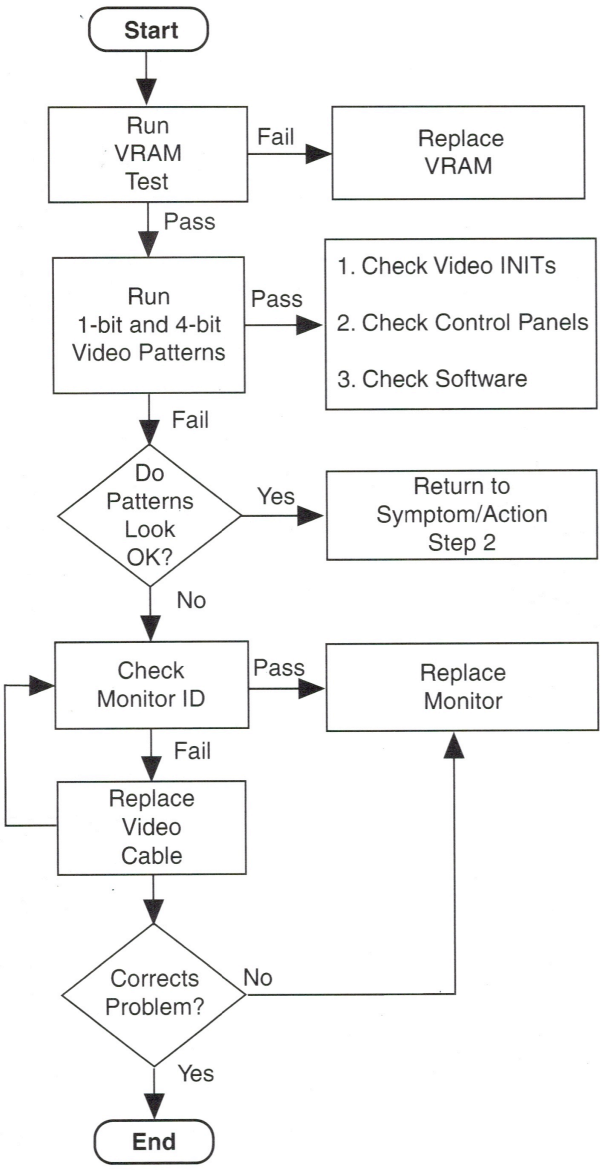
CD-ROM drive doesn't accept a CD	1. Insert a known-good disc into the drive. 2. Try a known-good CD caddy. 3. Run Apple TechStep SCSI Bus Scan test to verify unique SCSI address and to identify the ROM version. 4. Clean drive mechanism. 5. Swap CD-ROM drive mechanism.

Floppy Drive Problems	**Action**
Computer desktop can't see drive and neither can Apple TechStep; logic board passes all tests	– Verify internal floppy drive cable connections are secure.
Audio and video are present, but internal drive doesn't operate	1. Insert a known-good disk into drive. 2. Verify internal floppy drive cable connections are secure. 3. Verify all external SCSI devices are disconnected. 4. Run Apple TechStep Drive test. If test fails, swap drive cable. 5. Clean drive and install a dust shield. 6. Swap drive. 7. Run Apple TechStep All Logic tests. If a test fails, swap logic board. Move customer's SIMMs to new board.
Drive is unable to read; many file transfer errors occur	1. Insert a known-good disk into drive. 2. Verify internal floppy drive cable connections are secure. 3. Clean drive and install a dust shield. 4. Run Apple TechStep Drive test. If test fails, swap drive.
Drive will read but not write	1. Check internal floppy drive cable connections. If they are secure, replace internal floppy drive cable. 2. Clean drive and install a dust shield. 3. Run Apple TechStep Drive test. If test fails, swap drive.
Disk initialization fails	1. Verify you are using the proper type of media. 2. Insert a known-good disk into drive. 3. Clean drive and install a dust shield. 4. Check internal floppy drive cable connections. If they are secure, replace internal floppy drive cable. 5. Run Apple TechStep Drive test. If test fails, swap drive.
Drive doesn't eject disk	1. Switch computer off. Hold mouse button down while you switch computer on. 2. Eject disk manually by pushing opened paper clip into hole beside drive slot.

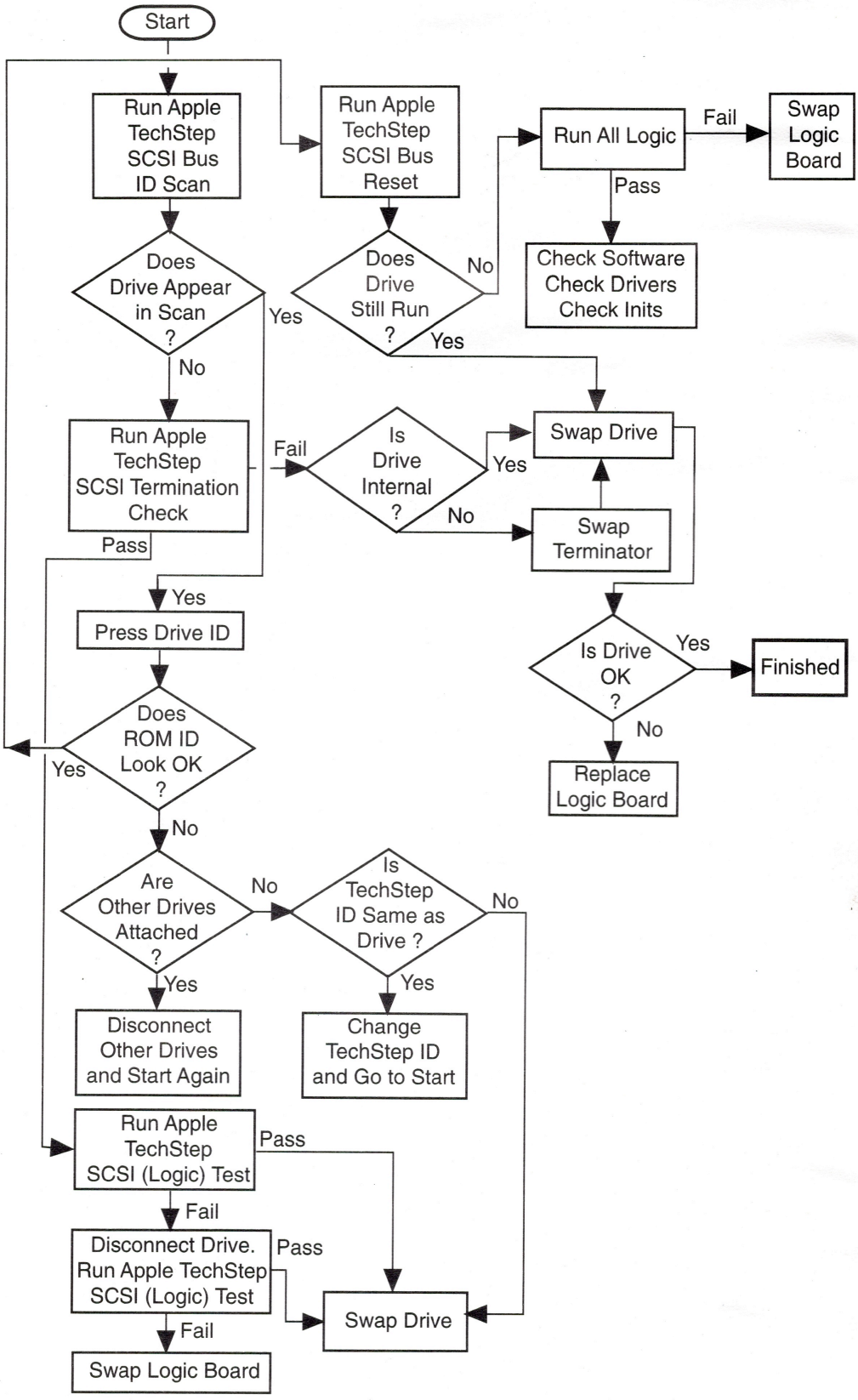
	3. Run Apple TechStep Drive test. If test fails, swap drive cable. 4. Swap drive.
Disk ejects; display shows icon with blinking "X"	1. Swap floppy disk with known-good system disk. 2. Run Apple TechStep Drive test. If test fails, swap drive cable 3. Swap drive. 4. Run Apple TechStep All Logic tests. If RAM (Standard) test fails, swap faulty SIMMs. If a test fails, swap logic board and move customer's SIMMs to new board.
Drive attempts to eject disk but can't	1. Push disk in completely. 2. To eject disk manually, push opened paper clip into hole beside drive slot. 3. Run Apple TechStep Drive test. If test fails, swap drive.

Printer Problems	**Action**
Known-good ImageWriter or ImageWriter II won't print	1. Make sure Chooser and Control Panel indicate ImageWriter icon and correct ImageWriter printer. 2. Verify printer—print through either serial port (modem or printer) or another computer. 3. Connect printer directly to computer. 4. Make sure system software is version 7.0 or later. 5. Swap printer driver and system software with known-good driver and known-good system software. 6. Run Apple TechStep All Logic tests. If SCC test fails, swap logic board and move customer's SIMMs to new board. If SCC test passes, swap computer-to-printer cable. 7. Use Apple TechStep destructive P/RAM test to clear parameter RAM. 8. For network troubleshooting information, refer to Networking & Communication manual in *Service Source*.
Known-good LaserWriter won't print	1. Make sure Chooser and Control Panel indicate LaserWriter icon and correct LaserWriter printer. 2. Connect printer directly to computer. 3. Swap printer driver and system software with known-good driver and known-good system software. 4. Run Apple TechStep All Logic tests. If SCC test fails, swap logic board and move customer's SIMMs to new board. If SCC test passes, swap computer-to-printer cable. 5. Use Apple TechStep destructive P/RAM test to clear parameter RAM. 6. For network troubleshooting information, refer to Networking & Communication manual in *Service Source*.

Flowchart 4-1 Video Problems



Flowchart 4-2 SCSI Drive Runs Continuously



Flowchart 4-3 SCSI Problems